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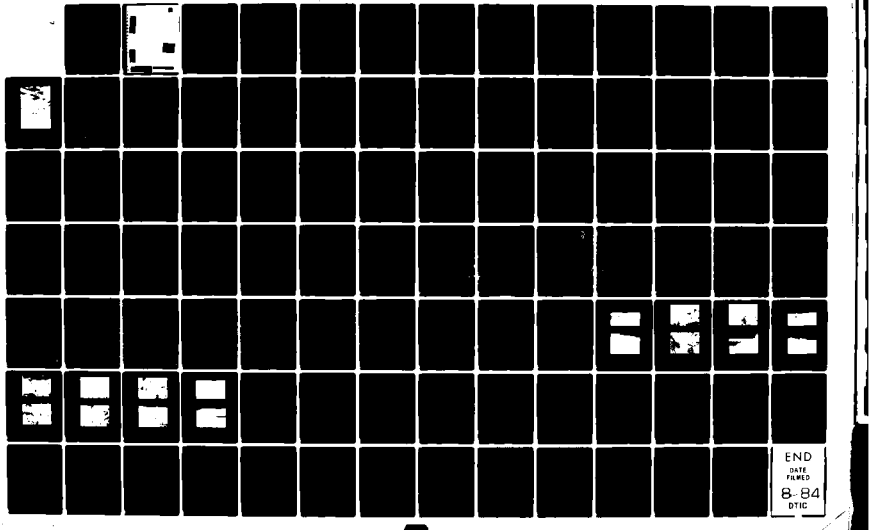

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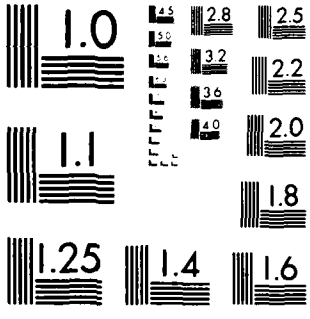

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

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Conn. Coastal Wallingford, Conn.
Ulbrich Reservoir Dam

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Ulbrich Reservoir Dam, also shown as Spring Brook Reservoir Dam, is an earthfill dam, about 2000 ft. long and 17 ft. high, with a minimum crest width of 16 ft. A 20 ft. long concrete ogee spillway with steel flashboards is located 350 ft. from the right abutment. The storage at top of dam is 4090 acre-feet. There is a valve extension operating stem controlling a 12-inch diameter outflow pipe located about 700 ft. from the left abutment. The purpose of the reservoir is to provide water supply storage discharges to Ulbrich Reservoir. A 16-inch force main leaves Ulbrich Reservoir sending water to Pistapaug Pond, which directs water into Wallingford Water System.

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DEPARTMENT OF THE ARMY

NEW ENGLAND DIVISION, CORPS OF ENGINEERS

424 TRAPELO ROAD

WALTHAM, MASSACHUSETTS 02254

NEDED

JUL 03 1984

Honorable William A. O'Neill
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor O'Neill:

Inclosed is a copy of the Ulbrich Reservoir Dam (CT-00038) Phase I Inspection Report, prepared under the National Program for Inspection of Non-Federal Dams. This report is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. I approve the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is vitally important.

Copies of this report have been forwarded to the Department of Environmental Protection, and to the owner, City of Wallingford, Wallingford, CT. Copies will be available to the public in thirty days.

I wish to thank you and the Department of Environmental Protection for your cooperation in this program.

Sincerely,

C. E. EDGAR, III
Colonel, Corps of Engineers
Commander and Division Engineer

Incl
As stated

ULBRICH RESERVOIR DAM
CT 00038

CONNECTICUT COASTAL
WALLINGFORD, CONNECTICUT

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

Identification No.	CT 00038
Name of Dam	Ulbrich Reservoir Dam
Town	Wallingford
County and State	New Haven County, Connecticut
Stream	Spring Brook
Date of Inspection	November 24, 1980

BRIEF ASSESSMENT

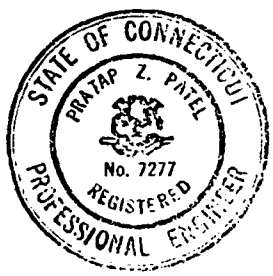
Ulbrich Reservoir Dam, also shown as Spring Brook Reservoir Dam, is an earthfill dam, about 2000 feet long and 17 feet high, with a minimum crest width of 16 feet. A 20 foot long concrete ogee spillway with steel flashboards is located 350 feet from the right abutment. The storage at top of dam is 4090 acre-feet. There is a valve extension operating stem controlling a 12-inch diameter outflow pipe located about 700 feet from the left abutment. The purpose of the reservoir is to provide water supply storage capacity. In relation to this, a 16-inch force main from Mackenzie Reservoir discharges to Ulbrich Reservoir. A 16-inch force main leaves Ulbrich Reservoir sending water to Pistapaug Pond, which directs water into the Wallingford Water System.

The dam was found to be in good condition. Growth of brush and trees on the upstream slope, crest, downstream slope and downstream toe in the spillway and outlet channels was noted. Evidence was found of a stream channel on the downstream slope and toe of the dam near the left abutment. The inspection also revealed minor cracks and spalling of the spillway apron.

The maximum storage at Ulbrich Reservoir dam is 4090 acre-feet with water at top of dam, which according to Corps guidelines classifies it as intermediate size. Based upon the high hazard potential to downstream property owners, the test flood was the Probable Maximum Flood. Using a drainage area of 0.95 square miles and "rolling terrain", it was estimated that the test flood inflow at this dam would be 2040 cfs, and after routing the flood through the reservoir a peak outflow of 75 cfs. The spillway with water at the top of the dam and with the flashboards in place will pass 1220 cfs or 1625% of the test flood outflow.

In accordance with the results of the visual inspection along with the hydrologic and hydraulic analysis of Ulbrich Reservoir Dam, additional engineering analysis and design are needed. Specifically, this would include removing brush and trees from the crest, slopes, and toe of the dam and replacing with compacted soil. Vegetation should also be cleared from the toe drain. Animal burrows should be backfilled. Trees and brush should be cleared from the spillway and outlet channels and riprap provided within 50 feet of the downstream toe. The stream channel near the left abutment should be repaired and runoff diverted from it in the future. Cracking and spalling of the spillway apron should be repaired. The dam should also be inspected for seepage at higher reservoir levels.

The recommendations and remedial measures are described in Section 7 and should be addressed within 2 years after receipt of this Phase I Inspection Report by the owner, except as noted in the report.



Pratap Z. Patel, P.E.
Project Manager

Pratap Z Patel

Philip W. Genovese & Associates, Inc.
Hamden, Connecticut

This Phase I Inspection Report on Ulbrich Reservoir Dam (CT-00038) has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgement and practice, and is hereby submitted for approval.

ARAMAST MAHTESIAN, MEMBER
Geotechnical Engineering Branch
Engineering Division

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

JOSEPH W. FINEGAN, JR., CHAIRMAN
Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation: however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at

some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flodd provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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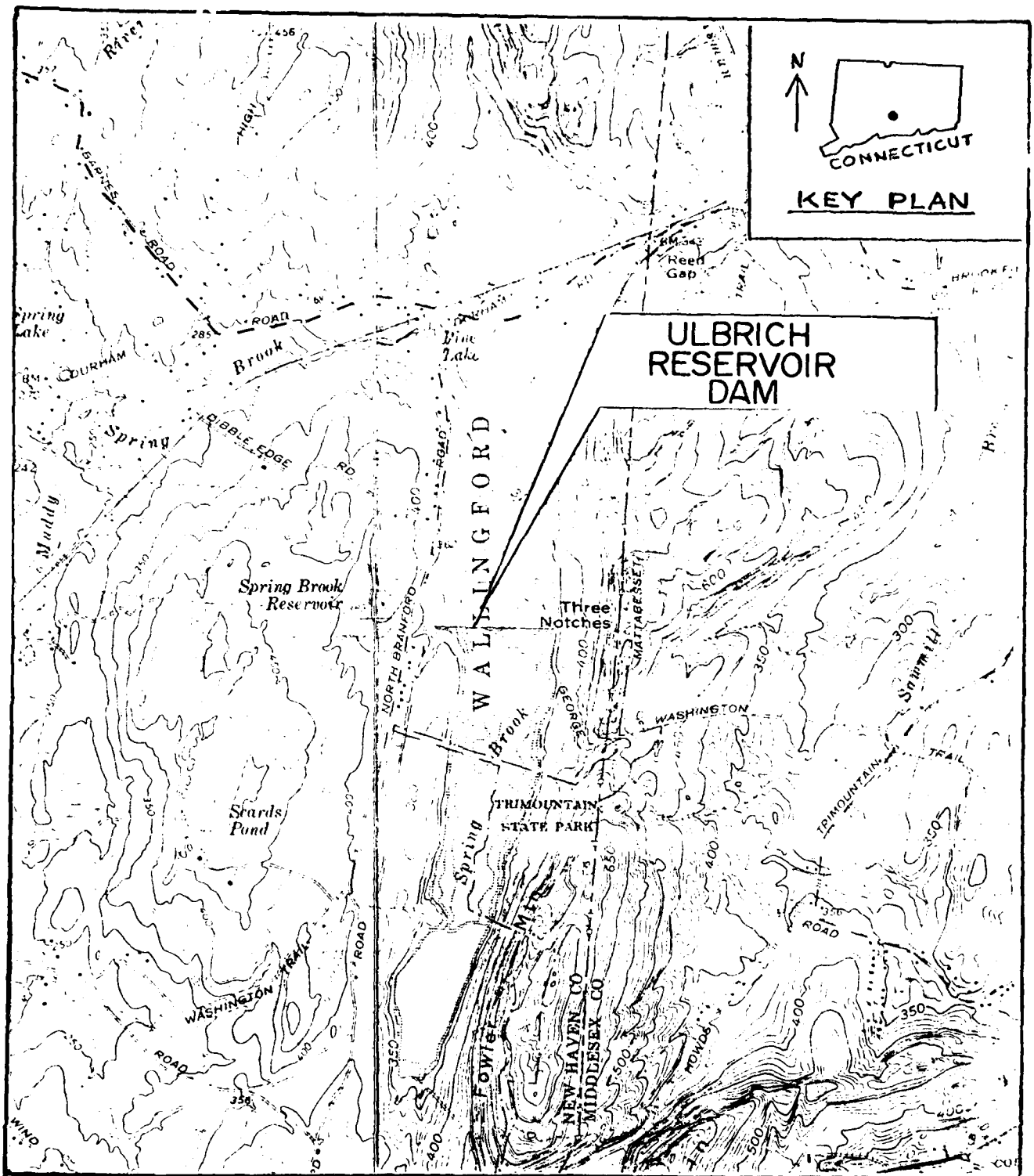
REPORT

APPENDIXES

U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS	OVERVIEW PHOTO DECEMBER, 1980 ULBRICH RESERVOIR DAM SPRING BROOK WALLINGFORD, CONNECTICUT
PHILIP W. GENOVESE AND ASSOCIATES, INC. ENGINEERS - HAMDEN, CT.		



USGS QUAD WALLINGFORD, CT. DURHAM, CT.	N	PHILIP W. GENOVESE AND ASSOCIATES, INC. ENGINEERS - HAMDEN, CT.	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.
SCALE IN FEET 0 1000 2000 3000 4000		NATIONAL PROGRAM OF INSPECTION OF NON - FED DAMS LOCATION MAP	

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT
ULBRICH RESERVOIR DAM - CT 00038

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Philip W. Genovese and Associates, Inc. has been retained by the New England Division to inspect and report on selected dams in South Central Connecticut. Authorization and notice to proceed were issued to Philip W. Genovese and Associates, Inc. under a letter of November 17, 1980 from Colonel William E. Hodgson Jr., Corps of Engineers. Contract No. DACW 33-81-C-0017 has been assigned by the Corps of Engineers for this work.

b. Purpose

1. Perform technical inspection and evaluation of non-federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-federal interests.

2. Encourage and prepare the states to initiate quickly effective dam safety programs for non-federal dams.

3. Update, verify, and complete the National Inventory of Dams.

1.2 Description of Project

a. Location

Ulbrich Reservoir Dam is located in the Town of Wallingford in New Haven County, Connecticut. The reservoir is located east of North Branford Road in the Town of Wallingford. The dam impounds the waters of Spring Brook, and is shown on the Durham, Connecticut Quadrangle with the approximate coordinates of North 41° 27.5'; West 72° 44.7'. Spring Brook joins the Muddy River approximately 2.1 miles downstream of the dam site.

b. Description of Dam and Appurtenances

Ulbrich Reservoir Dam is a 2000 foot long earthfill dam with a concrete cut-off wall. It has a maximum height of 17 feet. The crest width varies between a minimum of 16 feet and a maximum of 75 feet. The upstream slope of the dam is riprapped to within 4 feet of the crest and has a slope of 3:1. The downstream slope varies between 1.5:1 and 2.5:1 and has a 10-inch toe drain. There is a 20 foot long ogee type concrete spillway with steel flashboards located 350 feet from the right abutment. There are concrete wingwalls upstream of the spillway and concrete training walls along the 35 foot long downstream concrete apron. The channel is riprapped for a distance of 75 feet beyond the apron. There is a 12-inch outlet pipe passing through the dam approximately 700 feet from the left abutment. This is controlled by a gate valve with an extended stem protruding through the upstream slope of the dam. There are two 16-inch force mains entering and leaving the reservoir which control water levels and these are explained in more detail in Section 1.2 i. There is an unpaved service road which runs parallel to the dam downstream of the toe.

c. Size Classification

The dam's maximum impoundment of 4090 acre-feet places it in the INTERMEDIATE size category, using as a reference the size classification table in the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams. Table 1 of these guidelines classifies dams as intermediate size when they contain between 1,000 and 50,000 acre-feet of storage.

d. Hazard Classification

The hazard potential classification for this dam is HIGH, using the Corps Guidelines. There are at least two homes in the area which might be affected by a dam breach with the resultant loss of more than a few lives. Other factors to be considered in the classification are proximity of the dam to North Branford Road and Connecticut Highway Route #68, plus a railroad line and bridge. See pre-failure and post-failure elevations in table on Page 5-2, Section 5.5.

e. Ownership

The dam is owned by the City of Wallingford, Connecticut. The address is:

City of Wallingford
c/o Engineering Department
Town Farms Road
Wallingford, Connecticut 06492

Telephone 203-269-8708

f. Operator

The operation of the dam is controlled by the Water and Sewer Department of the City of Wallingford, Towns Farms Road, Wallingford, Connecticut. The Water and Sewer Authority Manager is Alfred Bruno, and the Authority's telephone number is 202-269-8795.

g. Purpose of the Dam

The purpose of the dam is for water supply for the City of Wallingford, Connecticut.

h. Design and Construction History

The dam was constructed in 1965-1966. Copies of construction plans were obtained and reviewed for this inspection, and pertinent sheets are included in Appendix B. The construction plans were originally dated November 20, 1964, with revisions shown on February 1, 1965. They are sealed by Laird Newell (CT. P.E. No. 62) and the consulting firm was the Henry Souther Engineering Company of 11 Laurel Street, Hartford, Connecticut.

i. Normal Operational Procedures

Ulbrich Reservoir is used as a water storage impoundment, water entering via a 16-inch force main from Mackenzie Reservoir and leaving a pump station at the southern end of Ulbrich Reservoir by another 16-inch force main which carries it to a high point between Ulbrich and Pistapaug Pond Reservoir. From this high point the water flows through an open channel to Pistapaug Pond, which is also owned by the Wallingford Water Company. From Pistapaug Pond the water enters directly into the water supply system. (Refer to the sketch of the Interbasin Transfer System in Appendix B, Sheet B-10).

The normal operating water level at Ulbrich Reservoir is 330.0 NGVD, which is five feet below the spillway crest with flashboards in place.

1.3 Pertinent Data

a. Drainage Area

The drainage area for this dam covers 0.95 square miles or 608 acres. Much of this land is owned by the Wallingford Water Company and 159 acres of it is the normal surface area of the reservoir. There are only a few houses in the entire watershed. Elevations range from 740 NGVD to 335 NGVD, and the terrain can best be described as hilly to mountainous.

b. Discharge at Damsite

1. The outlet works consists of a 12-inch pipe at invert elevation 310.0 which has a discharge capacity of 30 cfs.

2. The maximum reported water level of the dam is 333.0, indicating no flow over the spillway.

3. The ungated spillway capacity at top of dam elevation 342 is 1250 cfs.

4. The ungated spillway capacity at test flood elevation of 336.0 is 75 cfs.

5. The gated spillway capacity at normal pool elevation of 330 is not applicable.

6. The gated spillway capacity at test flood elevation of 339.4 is not applicable.

7. The total spillway capacity at test flood elevation of 336.0 is 75 cfs.

8. The total project discharge at top of dam elevation of 342.0 is 1250 cfs.

9. The total project discharge at test flood elevation of 336.0 is 75 cfs.

c. Elevation (feet above NGVD)

1. Streambed at toe of dam ...325.0
2. Bottom of cutoff ... Varies
3. Maximum tailwater...N/A
4. Normal pool...330.0
5. Full flood control pool...N/A
6. Spillway crest ...335.0 at top of flashboards
   333.0 without flashboards
7. Design surcharge (Original Design)...N/A
8. Top of dam...342.0
9. Test flood surcharge...339.4

d. Reservoir (Length in feet)

1. Normal pool...6650
2. Flood control pool...N/A
3. Spillway crest pool...6650
4. Top of dam...6850
5. Test flood pool...6800

e. Storage (acre-feet)

1. Normal pool...2980
2. Flood control pool...N/A
3. Spillway crest pool...2980
4. Top of dam...4090
5. Test flood pool...3655

f. Reservoir Surface (acres)

1. Normal pool...159
2. Flood-control pool...N/A
3. Spillway crest...159
4. Test flood pool...160
5. Top of dam...161

g. Dam

1. Type...Earthfill
2. Length...2000 feet
3. Height...17 feet
4. Top Width...16 feet
5. Side Slopes... upstream-3:1...downstream-varies - 2.5:1 to 1.5:1
6. Zoning...Not Known
7. Impervious Core...Reinforced concrete core wall
8. Cutoff...Concrete cutoff
9. Grout curtain...Unknown
10. Other...Unknown

h. Diversion and Regulating Tunnel

1. Type...16-inch force main which discharges to a riprapped channel.
2. Length...A pump station takes water from the reservoir and pumps it 1000 feet to elevation 440 where it discharges to an open channel and flows 1500 feet by gravity into Pistapaug Pond.
3. Closure...Locked Gate
4. Access...Private Service Road
5. Regulating Facilities...Controlled by pump station

i. Spillway

1. Type...Ogee
2. Length of weir...20 feet
3. Crest Elevation (with and without flashboards)...335.0... 333.0

i. Spillway (Continued)

4. Gates...None
5. Upstream Channel...Natural
6. Downstream Channel...Concrete apron for 35 feet, riprap following for 75 feet
7. General...Upstream-Concrete wing walls...Downstream-Concrete training walls

j. Regulating Outlets

1. Invert...310.0
2. Size...12-inch
3. Description...This outlet pipe passes through the dam near station 7 + 45 and discharges to an outlet channel on the downstream slope of the dam.
4. Control Mechanism...An extended gate valve stem is located on the upstream slope.

SECTION 2
ENGINEERING DATA

2.1 Design Data

This dam was constructed in 1965-1966 for water supply storage purposes. Construction plans for the dam were prepared by The Henry Souther Engineering Company of 11 Laurel Street, Hartford, Connecticut and are dated November 20, 1964 with revisions dated February 1, 1965. Copies of pertinent sheets are included in Appendix B.

2.2 Construction Data

No construction records were available for use in evaluating the dam.

2.3 Operation Data

No engineering operational data were disclosed.

2.4 Evaluation of Data

a. Availability

The construction plans used in the design of the dam were made available for this inspection.

b. Adequacy

The lack of in-depth engineering data did not allow for a complete review. Therefore, the condition of this dam could only be assessed from the standpoint of reviewing design plans and assessing it with respect to the visual inspection, past performance history and sound engineering judgment.

c. Validity

The results of our visual inspection indicate that the dam is basically in agreement with the construction plans. The major change noted was the addition of steel flashboards on the spillway crest, and the crest width between stations 6 + 75 and 13 + 75 which was measured in the field as 16 feet instead of a variable width up to 200 feet as shown on the construction plans (see pages B3, B4).

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. General

The field inspection of Ulbrich Reservoir Dam was made on November 24, 1980. The inspection team consisted of personnel from Philip W. Genovese & Associates, Inc. and Geotechnical Engineers, Inc. Inspection checklists, completed during the visual inspection, are included in Appendix A. At the time of inspection, the water level was approximately 8 feet below the spillway elevation with flashboards in place. The upstream face of the dam could only be inspected above this water level.

b. Dam

The dam is an earthfill dam about 2000 feet long and 17 feet high with a minimum crest width of 16 feet. A stationing system as shown on pages B1 through B5 was adopted for this report. The junction of the crest of the dam and the left abutment correspond to Sta 0 + 45 and the station numbers increase to the right. From Sta 0 + 45 to Sta 6 + 45 the dam has a crest width of 75 feet. From Sta 6 + 45 to Sta 11 + 45 and from Sta 15 + 45 to Sta 20+45 the crest width is 16 feet. From Sta 11 + 45 to Sta 15 + 45 the portion of the dam downstream from the crest consists of a hill of natural ground. (Photos No. 7, 15, 16).

A 20 foot wide concrete overflow spillway is located between Sta 16 + 75 and Sta 16 + 95 on the dam. A valve extension operating stem controlling flow in the 12-inch-diameter low-level outlet pipe at the base of the dam is located on the upstream slope about 20 feet below the crest at Sta 7 + 45.

The upstream slope of the dam contains riprap protection extending to an elevation about four feet below the crest. Low brush and occasional small trees are growing between stones in the upper 5 to 10 feet of the riprap left of the spillway (Photo No. 16) and in the upper 10 to 15 feet of the riprap right of the spillway (Photo No. 6). Low brush and small trees were also observed between stones in riprap protection on the left abutment (foreground, Photo No. 16). The riprap stones are generally 1 to 3 feet in size and in satisfactory condition. The upstream slope above the riprap is grass-covered with numerous small trees (Photo No. 15).

The downstream slope and toe are covered with brush and small trees up to 3 inches in diameter, obscuring much of the ground surface from close inspection (Photo Nos. 8 & 10). Portions of the slope that were observable showed no indications of movement. Several animal burrows extending at least one foot beneath the surface of the slope and 5 inches in diameter were observed on the downstream slope (see, for example, Photo No. 13). A small stream channel 12 to 20 inches deep, which collects surface runoff from the left abutment and downstream slope of the dam, extends from the left abutment (Sta 0+45) down the downstream slope to the downstream toe at Sta 3+45. The ground downstream from the toe of the dam from Sta 15+45 to Sta 20+45 and Sta 6+45 to Sta 11+45 was mushy, and standing water was observed at the toe drain outlet at Sta 7+45 (Photo No. 12).

No flow was observed from the 10-inch toe drains, which extend from Sta 16+45 to Sta 20+45 and from Sta 7+45 to Sta 11+45 (Photos Nos. 4, 5, and 12), and no flowing seepage was observed on the downstream slope or toe of the dam. At the time of inspection the reservoir elevation was 5 feet below the spillway crest, 2 feet above the toe drain elevation between Sta 16+45 and Sta 20+45, and about 8 feet above the toe drain elevation between Sta 7+45 and Sta 11+45.

c. Appurtenant Structures

The spillway consists of a concrete weir and training walls with steel flashboards, as shown in Photo No. 9. A concrete apron extends about 30 feet downstream from the weir and is in good condition with the exception of two minor cracks and some spalling. Three vertical hairline cracks extending beneath the water surface were observed on the upstream right training wall. Portions of the downstream training walls have been resurfaced with a slush coat of cement. A crack was observed through the spillway at Sta 16+87. This has been repaired and no leakage was observed through this crack. Slight lateral deflection was observed on the upstream left training wall. There were no indications of seepage adjacent to or through the downstream training walls.

The discharge channel of the spillway is paved with 6 to 12 inch riprap stone from the concrete apron to at least 75 feet downstream from the apron. Grass, brush and small trees grow from between the riprap stones in the floor of the channel. (Photo No. 3).

There is a 12-inch outlet pipe passing through the dam at Sta 7+45. It is controlled by a gate stem valve on the upstream slope of the dam which appears to be in good condition. The downstream outlet channel is overgrown with weeds (Photo 11).

d. Reservoir Area

There are no indications of instability along the banks of the reservoir in the vicinity of the dam.

e. Downstream Channel

The downstream channel consists of a natural stream bed and is the outlet channel for the 12-inch-diameter low-level outlet at Sta 7 + 45. This channel joins the discharge channel of the spillway about 350 feet downstream from the dam. The downstream channel is overgrown with brush and trees, and there was no observable riprap protection in the channel at the toe of the dam (Photo No. 11).

3.2 Evaluation

On the basis of the visual inspection, Ulbrich Reservoir Dam is judged to be in good condition. The following conditions, which may affect the long-term performance of the embankment, should be studied:

a. Growth of brush and trees on the upstream slope, crest, downstream slope and downstream toe of the dam which may: dislodge stones in riprap slope protection, prevent close inspection of the surface of the dam and obscure seepage, provide paths of seepage into the embankment, and plug outlets for the toe drains.

b. The formation of a stream channel on the downstream slope and toe of the dam between Stations 0 + 45 and 3 + 45, which may enlarge and cause significant erosion on the downstream slope.

c. Growth of brush and trees in the spillway discharge channel, which could obstruct flow in the channel.

d. The growth of brush and trees in the downstream channel at Sta 7 + 45 and the lack of riprap protection in the channel at the toe of the dam, which could obstruct flow and allow erosion at the toe of the dam when the low-level outlet is opened.

The dam should be re-inspected during higher reservoir levels to observe any evidence of seepage at the downstream toe or collection of seepage by the toe drains. Hairline cracks in the spillway training walls and the extent of the wet area at the downstream toe of the dam should be monitored periodically.

SECTION 4
OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures

a. General

The dam creates an impoundment of the water which is used for water supply purposes. An owner's representative visits the project at intervals of approximately once per week. According to Mr. Bruno of the Wallingford Water and Sewer Department, it is their general policy to keep the pool level three feet below the concrete spillway crest (elevation 330 NGVD).

b. Description of any Warning System in Effect

There are no warning systems in effect at this facility.

4.2 Maintenance Procedures

a. General

Maintenance work on the dam is not done as needed, and there is no regular work or inspection schedule.

b. Operating Facilities

Maintenance on the operating facilities is done as needed with no regular schedule of inspections. Current needs for maintenance work are evident in Photos Nos. 3, 4, 5, 7, 12, and 13.

4.3 Evaluation

The current operating procedures for the dam are adequate, but a formal downstream warning system should be developed and put into effect in case of an emergency at the dam. The maintenance procedures are not adequate due to the lack of work schedules and periodic inspections, which should be established. Also, a program of biennial technical inspections by qualified registered engineers should be instituted.

SECTION 5
EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General

Ulbrich Reservoir Dam is an earthfill dam approximately 2000 feet long and 17 feet high with a minimum crest width of 16 feet. The drainage area associated with this dam is 0.95 square miles, of which the reservoir proper occupies 0.25 square miles. The remainder of the drainage area is sparsely populated and best described as hilly to mountainous woodlands.

The dam has a maximum storage capacity of 4090 acre-feet with water at the top of dam and therefore, is classified as intermediate in size based on storage capacity. The Corps defines intermediate impoundments as those having between 1,000 and 50,000 acre-feet of storage.

Ulbrich Reservoir is used as a water supply storage impoundment. Excess water from Mackenzie Reservoir, a town reservoir located west of Ulbrich, is pumped to it to be held as storage. Water leaves Ulbrich via a 16-inch force main and is pumped to a high point located between it and Pistapaug Pond (another town reservoir located south of Ulbrich) from which point it flows by gravity along an open channel into Pistapaug Pond. Pistapaug Pond supplies water directly to the town water supply system. A schematic of this system is included in Appendix B.

The dam has a 20 foot long concrete ogee type spillway located between Station 16+75 and Station 16+95. There are concrete training walls upstream and downstream of the spillway with a 35 foot long concrete apron located on the downstream side. The spillway crest elevation is 333.0 NGVD with steel beam flashboards raising the overflow elevation to 335.0. A 12-inch outlet with a control valve on the upstream dam slope passes through the dam at elevation 310.0 NGVD near Station 7+45.

5.2 Design Data

The Wallingford Water Company supplied hydrologic and hydraulic design data with respect to reservoir storage capacity, surface area and drainage area. This information was used in this report and is included in Appendix B.

5.3 Experience Data

The maximum discharge at this dam site is unknown. However,

the owner reports the maximum observed water level is 333.0 indicating no flow over the spillway with flashboards in place.

5.4 Test Flood Analysis

As no detailed design and operational information are available, hydrologic evaluation was performed using dam information gathered by field inspection, watershed size and an estimated test flood equal to the Probable Maximum Flood (PMF) as determined by guide curves issued by the Corps of Engineers. Based on a drainage area of 0.95 square miles and rolling terrain, it was estimated that the test flood inflow at this dam would be 2,040 cfs. Following the guidance for Estimating Effect of Surcharge Storage on Maximum Probable Discharges, and assuming water at normal pool elevation 330.0, results in a test flood discharge of 75 cfs. The maximum spillway capacity with the reservoir at the top of the dam and the flashboards in place is 1222 cfs or 1625% of the test flood discharge. A full test flood would raise the reservoir level to 336.0 NGVD or 6 feet below the top of dam.

5.5 Dam Failure Analysis

The impact of failure of the dam at maximum pool was assessed using the "Rule of Thumb" Guidance for Estimating Downstream Dam Failure Hydrographs issued by the Corps of Engineers.

A major breach of the dam with water at elevation 336.0 would result in a breach width of 560 feet and a peak discharge of 34,350 cfs. The spillway flow would add an additional 75 cfs, for a total of 34,425 cfs. The total storage at this elevation is 3140 acre-feet. The impact of this failure is summarized in the following table:

Section*	Reach Feet downstream of Dam	Pre-Failure Elevation NGVD	Post-Failure Elevation NGVD	Structures Affected-Elevation
	Dam			0
A-A	28 + 50	310.2	318.6	0
B-B	43 + 50	310.2	319.3	House/320-Rt 68/315-320
C-C	65 + 50	291.0	307.1	RR/300
D-D	85 + 50	270.3	277.2	House/278 House/278
E-E	111 + 50	240.5	249.6	

*See page D-1 for location of cross sections

Because there is a potential for 1 to 3 feet of water in 2 houses downstream there could be a loss of more than a few lives. There could also be disruption and damage to a major state road (Route 68) and railroad. In view of these factors, a high hazard rating is justified.

SECTION 6
EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations

The visual observations did not disclose any immediate stability problems. However, brush and trees on the slopes of the dam could dislodge riprap protection and provide paths of seepage into the embankment. Growth of vegetation at the toe drain outlets could plug the drains, and roots from brush and trees growing over the toe drains could damage the toe drain filter and permit seepage to bypass the drain. Lack of riprap protection in the downstream channel at the toe of the dam at Sta 7 + 45 and continued development of the stream channel on the downstream slope between Stations 0 + 45 and 3 + 45 could result in significant erosion of the downstream slope and toe of the dam.

6.2 Design and Construction Data

Design and construction plans of the dam prepared by the Henry Souther Engineering Company and dated February 1, 1965 indicate the dam is a zoned embankment dam with a downstream pervious zone, a central impervious core and a concrete core wall keyed into bedrock beneath the dam. The plans indicate that the embankment fill materials were compacted when placed, but the degree of compaction is not noted.

The design drawings did not disclose any evidence of potential stability problems.

6.3 Post-Construction Changes

There are no records of post-construction changes.

6.4 Seismic Stability

The dam is located in Seismic Zone 1 and, in accordance with Corps of Engineers' guidelines, does not warrant further seismic analysis at this time.

SECTION 7
ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition

On the basis of the visual inspection and examination of design plans, Ulbrich Reservoir Dam is judged to be in good condition.

b. Adequacy of Information

The assessment of the condition of the dam is based upon the results of the visual inspection and examination of the design and construction plans prepared by the Henry Souther Engineering Company and dated February 1, 1965.

c. Urgency

The recommendations and remedial measures presented in Sections 7.2 and 7.3 should be implemented by the Owner within two years after receipt of the Phase I Inspection Report, except as noted in Sections 7.2 and 7.3.

7.2 Recommendations

The Owner should retain the services of a registered professional engineer qualified in the design and inspection of dams to accomplish the following:

1. Place riprap protection in the downstream channel within 50 feet of the downstream toe of the dam.

2. Intercept surface runoff from the left abutment and channel runoff away from the downstream slope. Backfill stream channel on downstream slope between Stations 0+45 and 3+45 with appropriate compacted soil.

3. Inspect the dam for evidence of seepage when there is additional water in the reservoir.

7.3 Remedial Measures

a. Operating and Maintenance Procedures. The Owner should:

1. Clear grass and brush growing on downstream slope and from top of riprap on upstream slope and cut grass on crest, upstream and downstream slopes and downstream toe at least annually.

2. Institute a program of biennial technical inspection by a registered professional engineer.

3. Establish a surveillance program for use during and immediately after heavy rainfall and also a downstream warning program to follow in case of emergency.

4. Repair cracking and spalling of spillway apron.

5. Within one year, remove trees, brush and root systems from the crest, slopes, and within 20 feet of the downstream toe of the dam and backfill with appropriate compacted soil.

6. Within one year, remove vegetation in the vicinity of the toe drain outlets to prevent blockage of the outlets.

7. Within one year, backfill animal burrows in the downstream slope with appropriate compacted soil.

8. Within one year, cut brush and trees growing in the spillway discharge channel and downstream channel at Station 7+45 within 100 feet of the downstream toe of the dam.

9. Within one year, establish a protective growth of grass over all bare spots.

7.4 Alternatives

There are no practical alternatives to the recommendations of Sections 7.2 and 7.3.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT Ulbrich Reservoir Dam

DATE: November 24, 1980

TIME 2:00 p.m.

WEATHER Light rain, 45°F

W.S. ELEV. 5.9 ft U.S. DN.S. below spillway crest

PARTY:

1. P. Patel - Genovese
2. W. Gancarz - Genovese
3. R. Murdock - Geotechnical Engineers
4. R. Stetkar - Geotechnical Engineers
5.
6.
7.
8.
9.
10.

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Geotechnical	R. Murdock, R. Stetkar	
2.	Hydraulics	W. Gancarz	
3.	Structural	P. Patel	
4.			
5.			
6.			
7.			
8.			
9.			
10.			

PERIODIC INSPECTION CHECK LIST

PROJECT Ulbrich Reservoir Dam — DATE November 24, 1980

PROJECT FEATURE Dam Embankment — NAME

DISCIPLINE Geotechnical — NAME Murdock/Stetkar

AREA EVALUATED	CONDITIONS
DAM EMBANKMENT	Stationing for visual inspection: Sta 0+45 corresponds to left abutment—station-numbers increase to right.
Crest Elevation	333.0 -Without flashboards 335.0 -With flashboards
Current Pool Elevation	327.1
Maximum Impoundment to Date	Elevation 333.0
Surface Cracks	None Observed
Pavement Condition	Gravel roadway on crest left of spillway - satisfactory
Movement or Settlement of Crest	None Observed
Lateral Movement	None Observed
Vertical Alignment	Good
Horizontal Alignment	Good
Condition at Abutment and at Concrete structures	Satisfactory
Indications of Movement of Structural Items on Slopes	N/A
Trespassing on Slopes	Free access to crest and slopes, Gravel roadway on crest; tire ruts on upstream edge of crest at Sta 1+30 Service road on downstream slope from Sta 14+45 to Sta 17+45 Small animal burrows on downstream slope.
Sloughing or Erosion of Slopes or Abutments	Small stream channel 12 to 20 inches deep eroded in downstream slope between Sta 0+45 and Sta 3+45

PERIODIC INSPECTION CHECKLIST

PROJECT Ulbrich Reservoir Dam — DATE November 24, 1980

PROJECT FEATURE Dam Embankment — NAME

DISCIPLINE Geotechnical — NAME Murdock/Stetkar

AREA EVALUATED	CONDITION
Rock Slope Protection - Riprap Failures	Riprap slope protection on upstream slope is in satisfactory condition.
Unusual Movement or Cracking at or Near Toe	None observed.
Unusual Embankment or Downstream seepage	None observed. Area downstream from dam is generally mushy; source of water unknown.
Piping or Boils	None observed.
Foundation Drainage Features	None
Toe Drains	Toe drain with 10 inch diameter concrete pipe from Sta 7+45 to Sta 11+45 and Sta 16+45 to Sta 20+45.
Instrumentation System	None
Vegetation	Heavy growth of brush and trees on downstream slope and on crest and upstream slope right of spillway. Upstream slope left of spillway grass-covered with occasional trees up to 3 inches in diameter. Some small brush growing in upstream riprap.

PERIODIC INSPECTION CHECK LIST

PROJECT Ulbrich Reservoir Dam DATE November 24, 1980

PROJECT FEATURE Dike Embankment NAME

DISCIPLINE Geotechnical NAME Murdock/Stetkar

AREA EVALUATED	CONDITION
DIKE EMBANKMENT	No dike embankment
Crest Elevation	
Current Pool Elevation	
Maximum Impoundment to Date	
Surface Cracks	
Pavement Condition	
Movement or Settlement of Crest	
Lateral Movement	
Vertical Alignment	
Horizontal Alignment	
Condition at Abutment and at Concrete Structures	
Indications of Movement of Structural Items on Slopes	
Trespassing on Slopes	
Sloughing or Erosion of Slopes or Abutments	
Rock Slope Protection - Riprap Failures	
Unusual Movement or Cracking at or near Toes	
Unusual Embankment or Downstream Seepage	
Piping or Boils	
Foundation Drainage Features	
Toe Drains	
Instrumentation System	
Vegetation	

PERIODIC INSPECTION CHECK LIST

PROJECT Ulbrich Reservoir Dam DATE November 24, 1980

PROJECT FEATURE Outlet Works - Intake NAME

DISCIPLINE Geotechnical NAME Murdock/Stetkar

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	Approach channel under water and not observable.
Slope Conditions	
Bottom Conditions	
Rock Slides or Falls	
Log Boom	
Debris	
Condition of Concrete Lining	
Drains or Weep Holes	
b. Intake Structure	N/A
Condition of Concrete	
Stop Logs and Slots	

PERIODIC INSPECTION CHECK LIST

PROJECT Ulbrich Reservoir Dam — DATE November 24, 1980

PROJECT FEATURE Outlet Works - Control Tower — NAME

DISCIPLINE Structural — NAME P. Patel

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	
a. Concrete and Structural	Only visible portion is the casing to an extended valve stem which controls a a 12 inch outlet pipe. (Station 7+45)
General Condition	Good
Condition of Joints	
Spalling	
Visible Reinforcing	
Rusting or Staining of Concrete	
Any Seepage or Efflorescence	
Joint Alignment	
Unusual Seepage or Leaks in Gate Chamber	
Cracks	
Rusting or Corrosion of Steel	
b. Mechanical and Electrical	
Air Vents	
Float Wells	
Crane Hoist	
Elevator	
Hydraulic System	
Service Gates	
Emergency Gates	
Lightning Protection System	
Emergency Power System	
Wiring and Lighting System	

PERIODIC INSPECTION CHECK LIST

PROJECT Ulbrich Reservoir Dam

DATE November 24, 1980

PROJECT FEATURE Outlet - Conduit

NAME

DISCIPLINE Geotechnical

NAME Murdock/Stetkar

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	Not Visible
General Condition of Concrete	
Rust or Staining on Concrete	
Spalling	
Erosion or Cavitation	
Cracking	
Alignment of Monoliths	
Alignment of Joints	
Numbering of Monoliths	

PERIODIC INSPECTION CHECK LIST

PROJECT Ulbrich Reservoir Dam DATE November 24, 1980

PROJECT FEATURE Outlet - Outlet Structure & Channel NAME

DISCIPLINE Geotechnical/Structural NAME Murdock/Stetkar/Patel

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	Only the outlet pipe was visible.
General Condition of Concrete	Good
Rust or Staining	
Spalling	
Erosion or Cavitation	
Visible Reinforcing	
Any Seepage or Efflorescence	
Condition at Joints	
Drain holes	N/A
Channel	Natural stream channel at Sta 7+45
Loose Rock or Trees Overhanging Channel	Trees overhang both sides of channel about 250 feet downstream from dam.
Condition of Discharge Channel	Poor. Channel overgrown with grass and brush.

PERIODIC INSPECTION CHECKLIST

PROJECT Ulbrich Reservoir Dam DATE November 24, 1980

PROJECT FEATURE Outlet - Spillway NAME

DISCIPLINE Geotechnical/Structural/Hydraulics NAME Murdock/Stetkar/Patel/Gancarz

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	Approach channel under water and observable within 15 feet of spillway weir.
General Condition	Observable portion is satisfactory.
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None
Floor of Approach Channel	Observable portion consists of riprap.
b. Weir and Training Walls	
General Condition of Concrete	Good
Rust or Staining	No
Spalling	No
Any Visible Reinforcing	No
Any Seepage or Efflorescence	
Drain Holes	Three 1 inch in diameter weep holes in training walls downstream from weir; two plugged with concrete and not functional.
c. Discharge Channel	
General Condition	Fair - Crack noted-spalling on apron
Loose Rock Overhanging Channel	None

PERIODIC INSPECTION CHECKLIST

PROJECT Ulbrich Reservoir Dam DATE November 24, 1980

PROJECT FEATURE Outlet - Spillway NAME

DISCIPLINE Goetechnical/Structural/Hydraulics NAME Murdock/Stetkar/Patel/Gancarz

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
Trees Overhanging Channel	Small trees overhang both sides of channel about 100 feet downstream.
Floor of Channel	Riprap with brush and grass growing between stones.
Other Obstructions	None
Other Comments	Wooden bridge spans channel 75 feet downstream from dam. 40 feet diameter stilling basin 5 feet deep about 50 feet downstream from bridge. Outlet channel continues downstream from basin approximately parallel to dam.

PERIODIC INSPECTION CHECK LIST

PROJECT Ulbrich Reservoir Dam DATE November 24, 1980

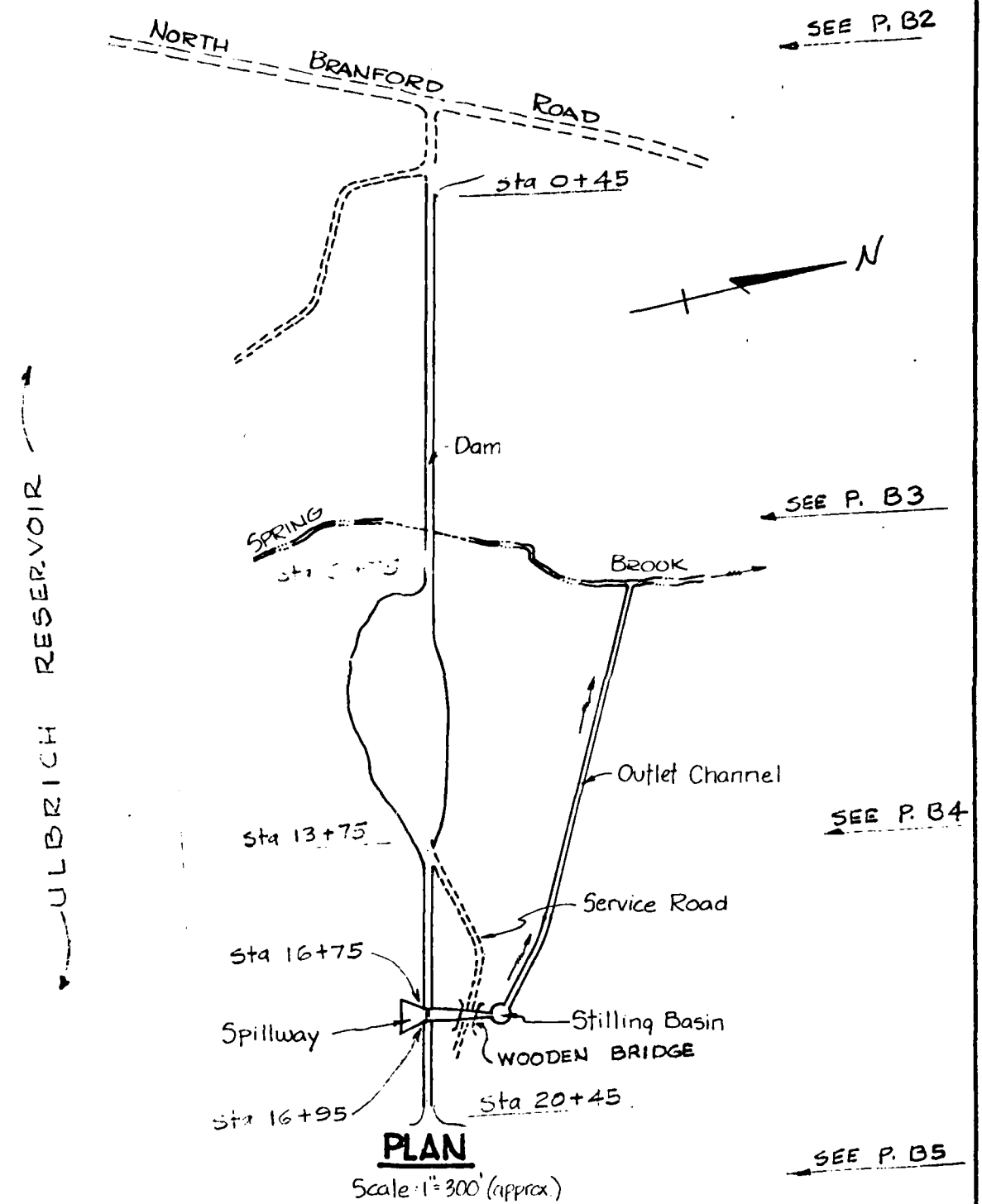
PROJECT FEATURE Outlet Works - Service Bridge NAME

DISCIPLINE Geotechnical NAME Murdock/Stetkar

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	
a. Super Structure	None
Bearings	
Anchor Bolts	
Bridge Seat	
Longitudinal Members	
Under Side of Deck	
Secondary Bracing	
Deck	
Drainage System	
Railings	
Expansion Joints	
Paint	
b. Abutment & Piers	
General Condition of Concrete	
Alignment of Abutment	
Approach to Bridge	
Condition of Seat & Backwall	

APPENDIX B

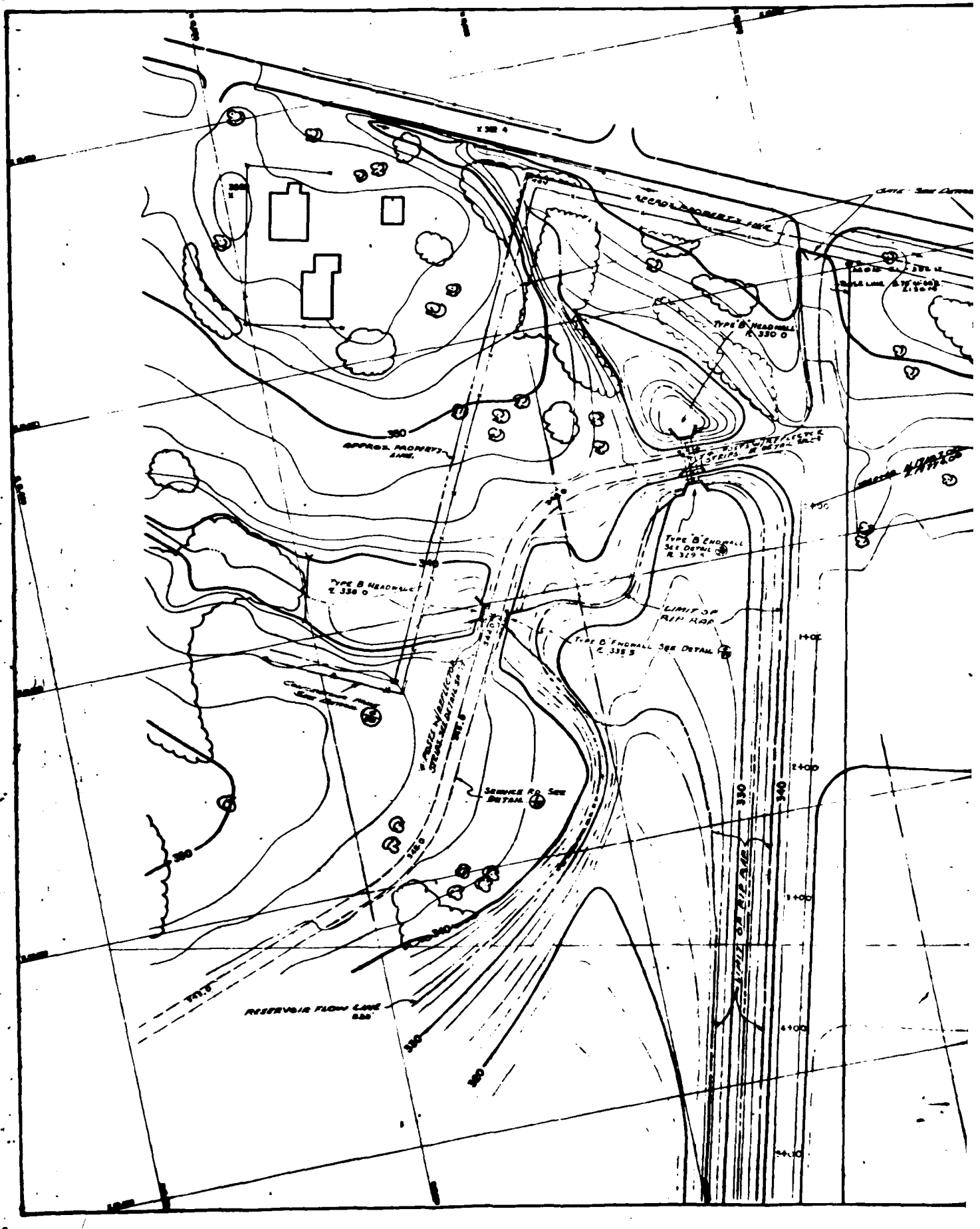
ENGINEERING DATA

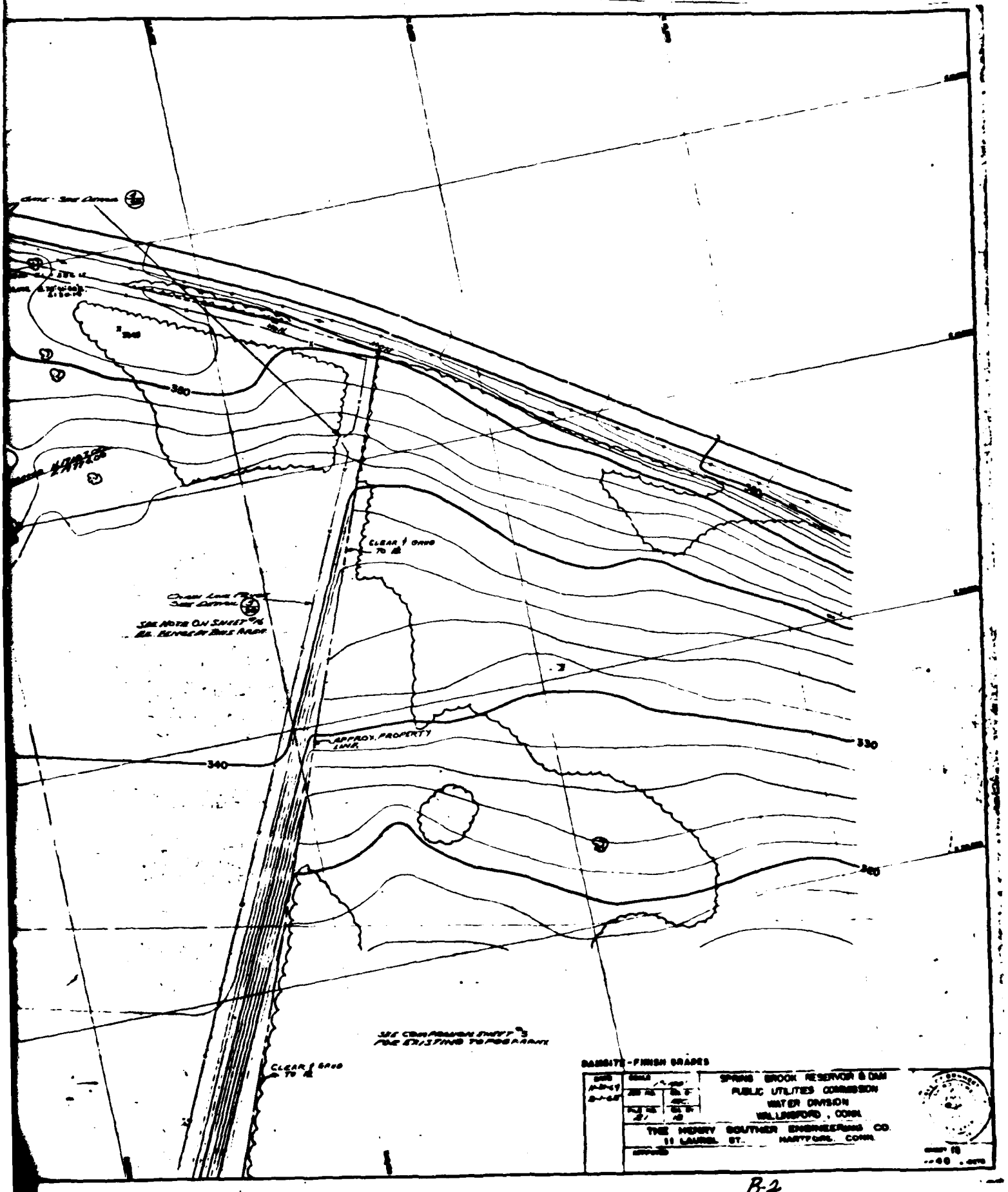


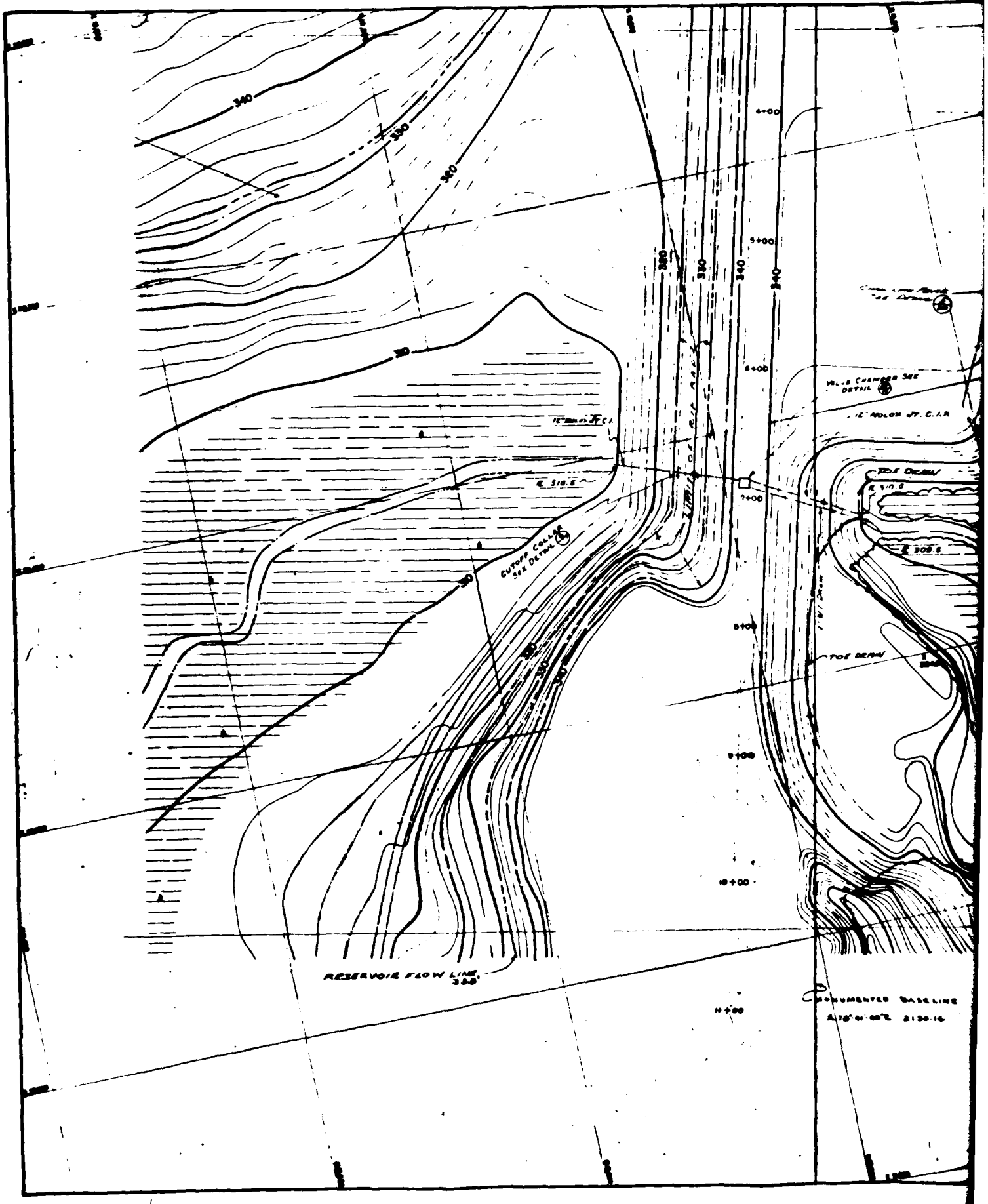
PLAN

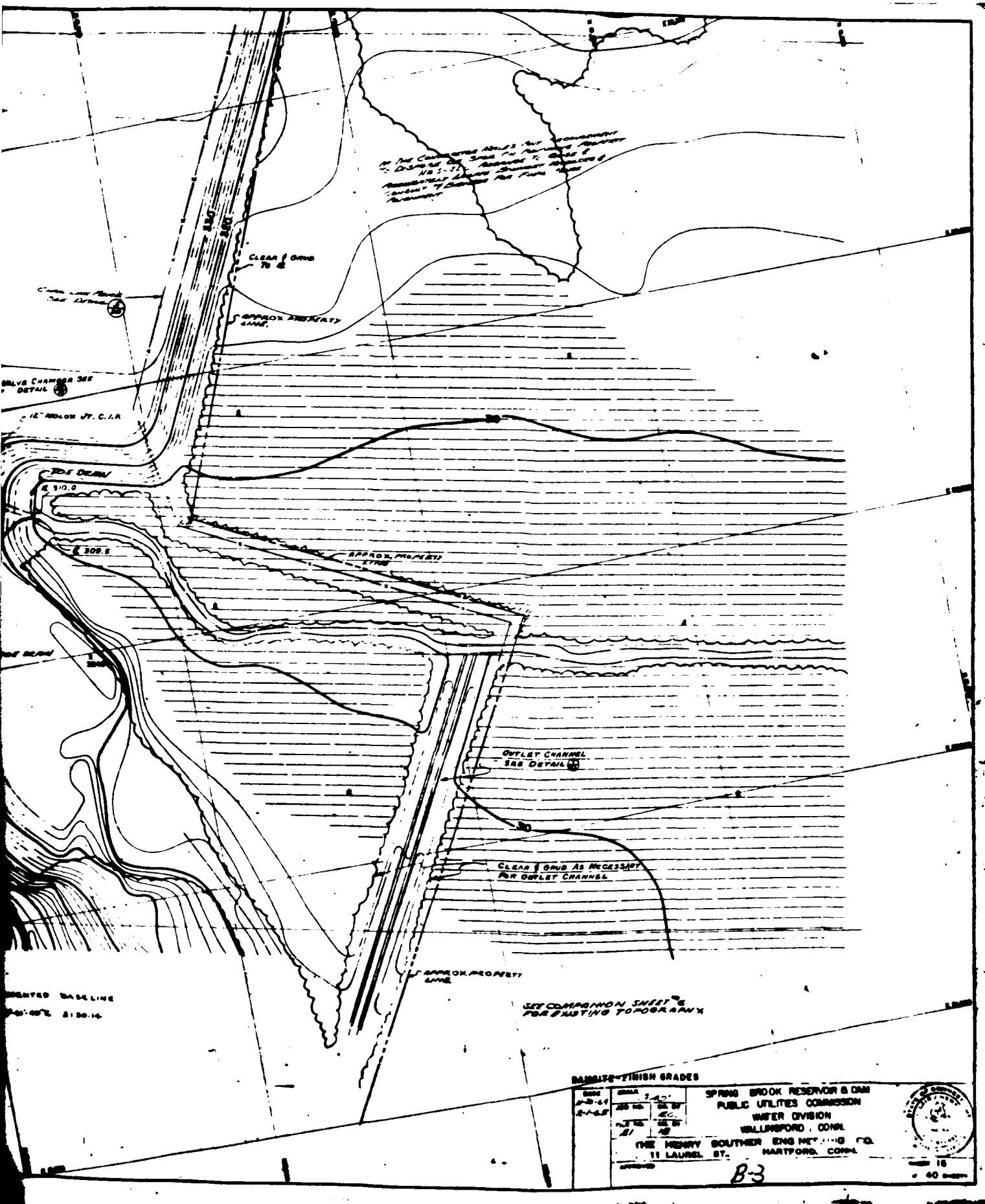
Scale: 1" = 300' (approx.)

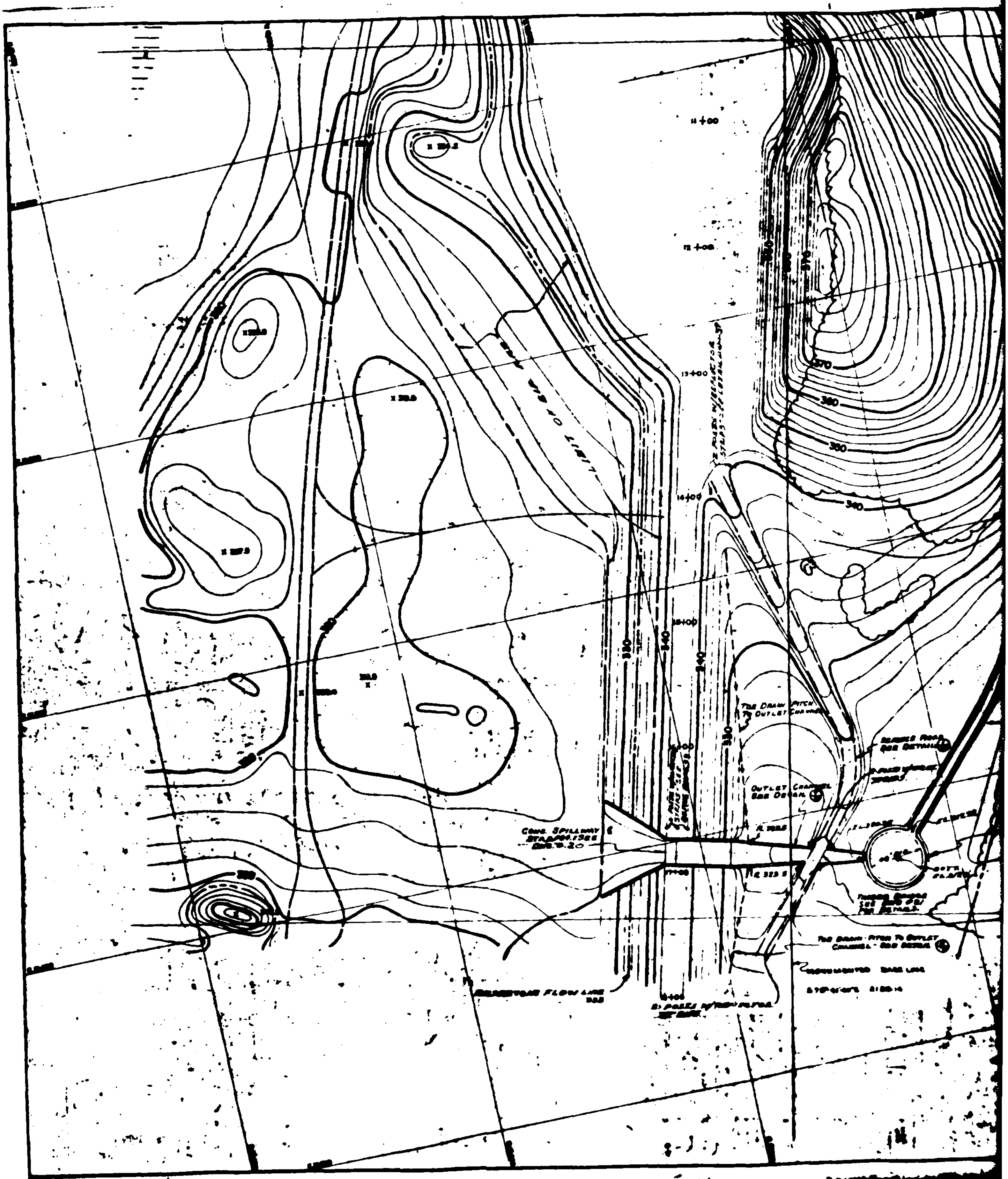
PHILIP W. GENOVESE & ASSOCIATES, INC. ENGINEERS HAMDEN, CONNECTICUT	ULBRICH RESERVOIR DAM (CT00038)

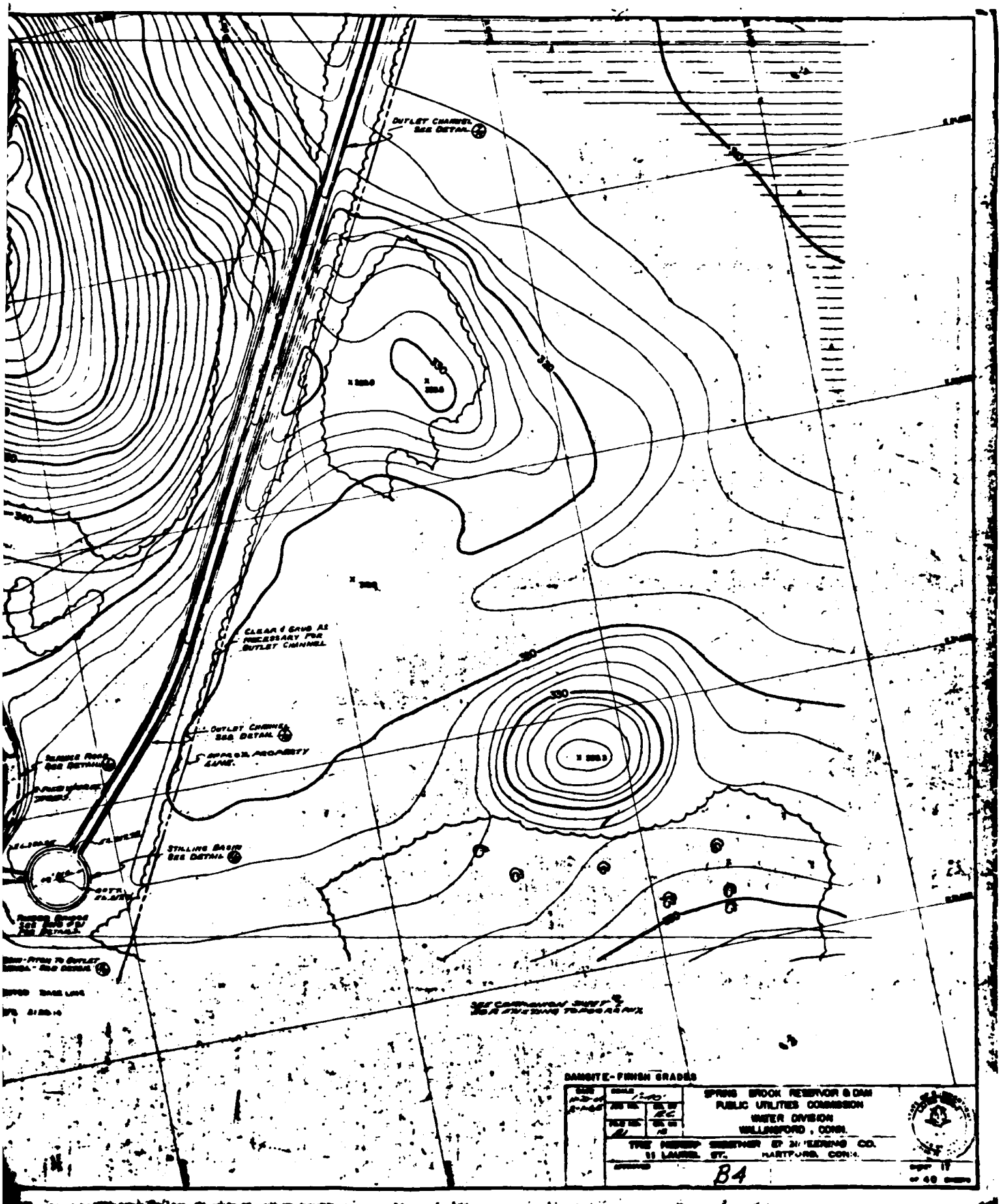

APPROX. PROPERTY LINE
TYPE 'B' HEADWALL
TYPE 'B' ENDWALL SEE DETAIL
LIMIT OF RIP RAP
SERVICE RD. SEE DETAIL
RESERVOIR FLOW LINE
CENTER LINE OF RIDGE
330
340
350

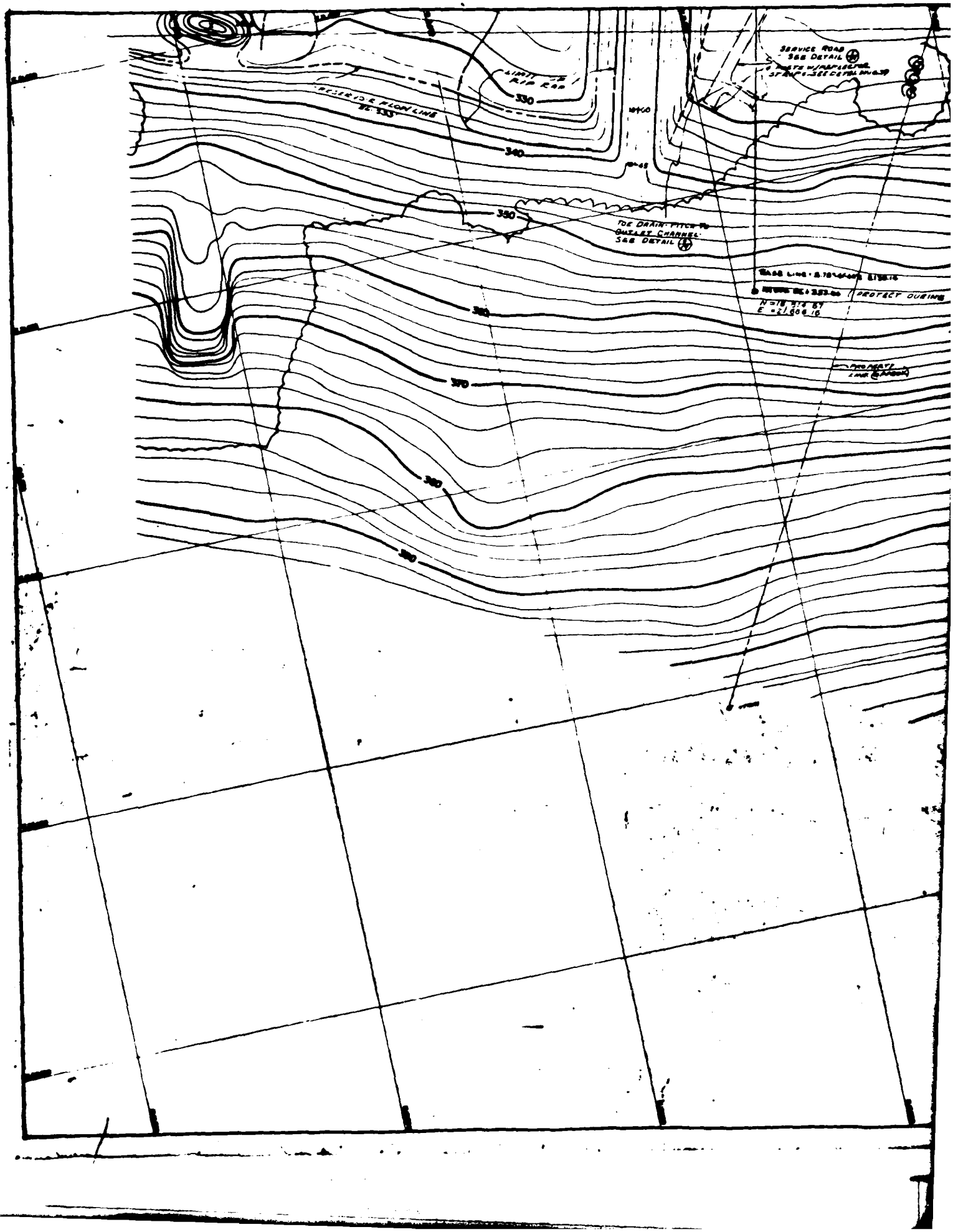

360
340
330
CLEAR 1 OHIO TO Δ
APPROX. PROPERTY LINE
CLEAR 1 OHIO TO Δ
RAMSITE - FINISH GRADES
SPRING BROOK RESERVOIR & DAM
PUBLIC UTILITIES COMMISSION
WATER DIVISION
WALLINGFORD, CONN.
THE HENRY SOUTHER ENGINEERING CO.
11 LAUREL ST. HARTFORD, CONN.

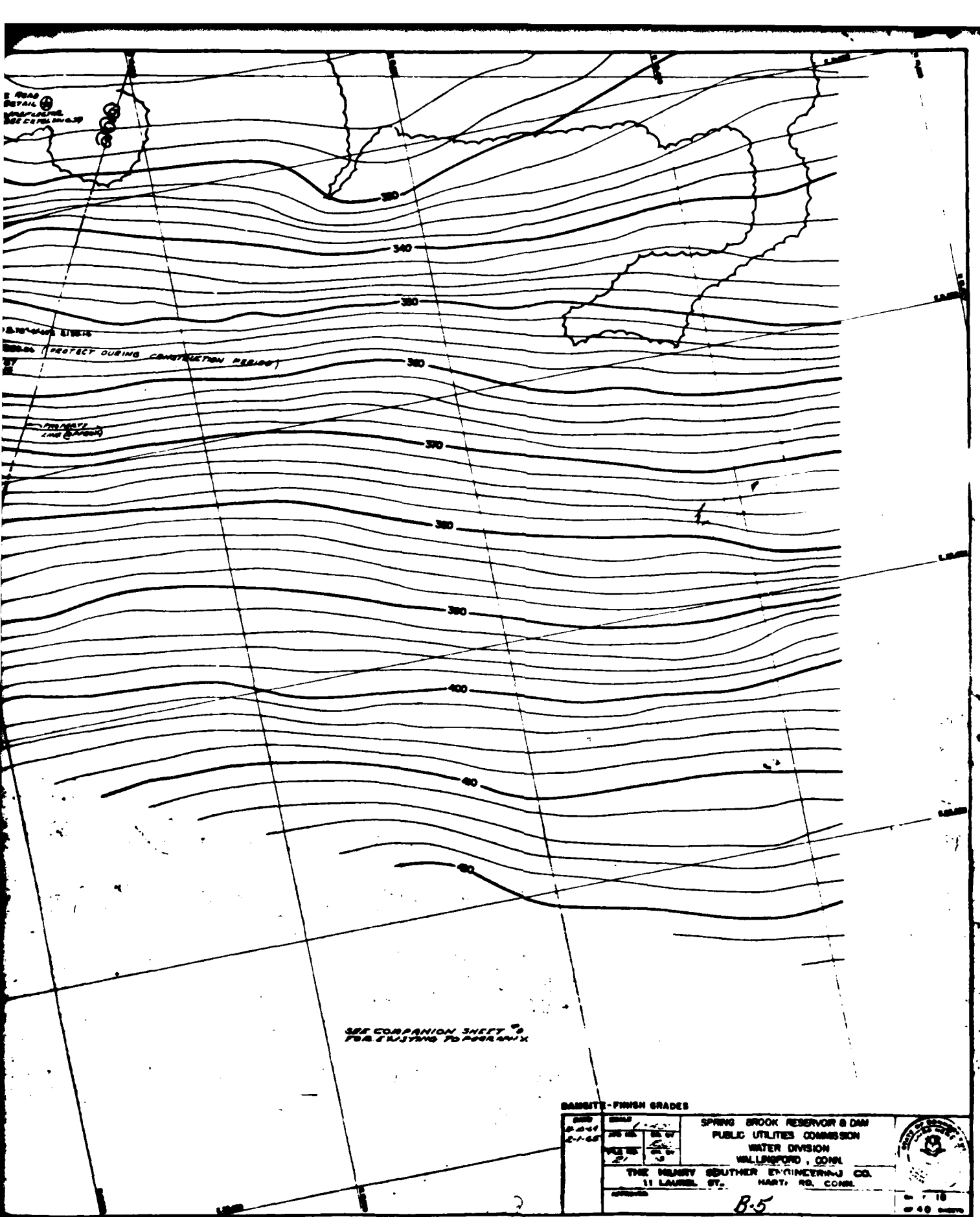

340
350
360
330
340
340
4+00
5+00
6+00
7+00
8+00
9+00
10+00
11+00
TOE DRAIN
TOE DRAIN
CUTOFF COLLAR SEE DETAIL
VALVE CHAMBER SEE DETAIL
RESERVOIR FLOW LINE 338'
DOCUMENTED BASELINE

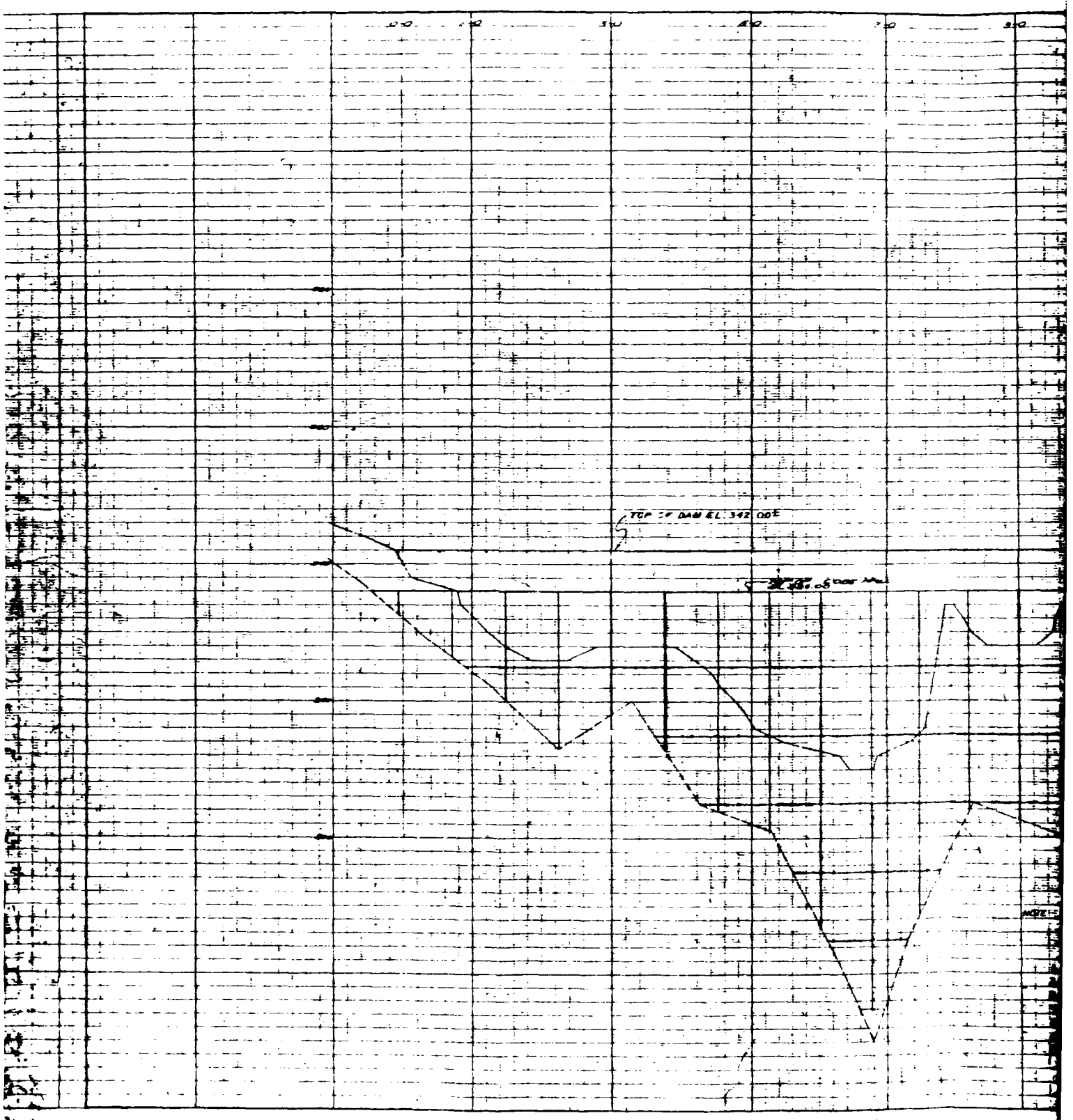

CLEAR & GRUB TO ℄
APPROX. PROPERTY LINE
VALVE CHAMBER SEE DETAIL
12" ASBLOW JT. C.I.P.
SIDE DRAIN
℄ 310.0
℄ 309.5
APPROX. PROPERTY LINE
OUTLET CHANNEL SEE DETAIL
CLEAR & GRUB AS NECESSARY FOR OUTLET CHANNEL
APPROX. PROPERTY LINE
SEE COMPANION SHEET "E" FOR EXISTING TOPOGRAPHY
BASALTIC FINISH GRADES
SPRING BROOK RESERVOIR & DAM
PUBLIC UTILITIES COMMISSION
WATER DIVISION
WALLINGFORD, CONN.
THE HENRY SOUTHER ENGINEERING CO.
11 LAUREL ST. HARTFORD, CONN.
B-3

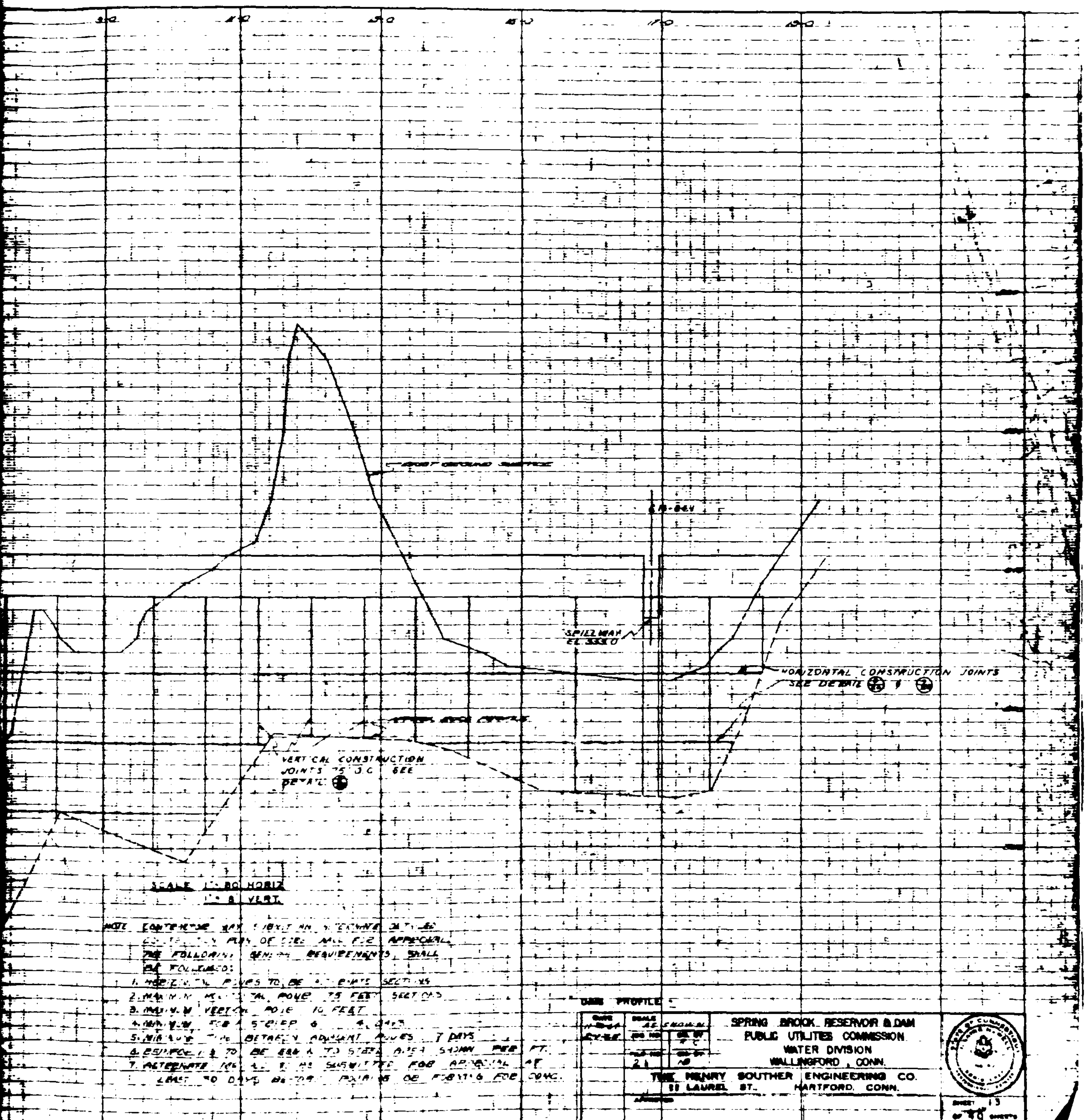

11+00
12+00
13+00
14+00
15+00
370
360
350
340


OUTLET CHANNEL
SEE DETAIL
CLEAR & GRUB AS
NECESSARY FOR
OUTLET CHANNEL
OUTLET CHANNEL
SEE DETAIL
APPROX. PROPERTY
LINE
STILLING BASIN
SEE DETAIL
SEE CONTINUATION SHEET
FOR STRUCTURE TOPOGRAPHY
DAMSITE - FINISH GRADES
SPRING BROOK RESERVOIR & DAM
PUBLIC UTILITIES COMMISSION
WATER DIVISION
WILLIMANTIC, CONN.
THE HOWARD SHEERTHER ENGINEERING CO.
11 LAUREL ST. HARTFORD, CONN.
B4

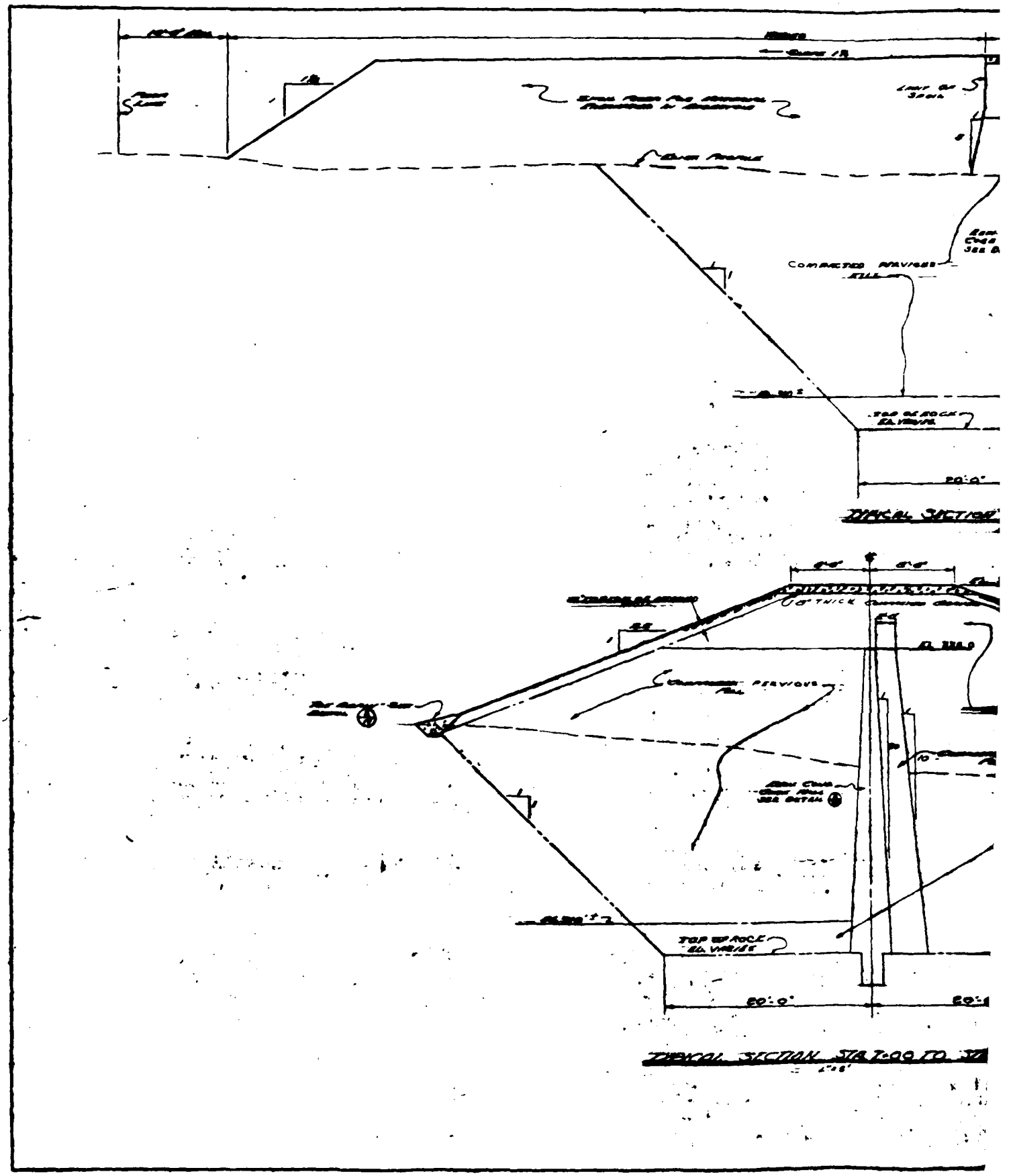

SERVICE ROAD
SEE DETAIL
LIMIT OF RIP RAP
330
340
350
360
370
380
390
TOE DRAIN PIPES TO OUTLET CHANNEL
SEE DETAIL
PROPERTY LINE

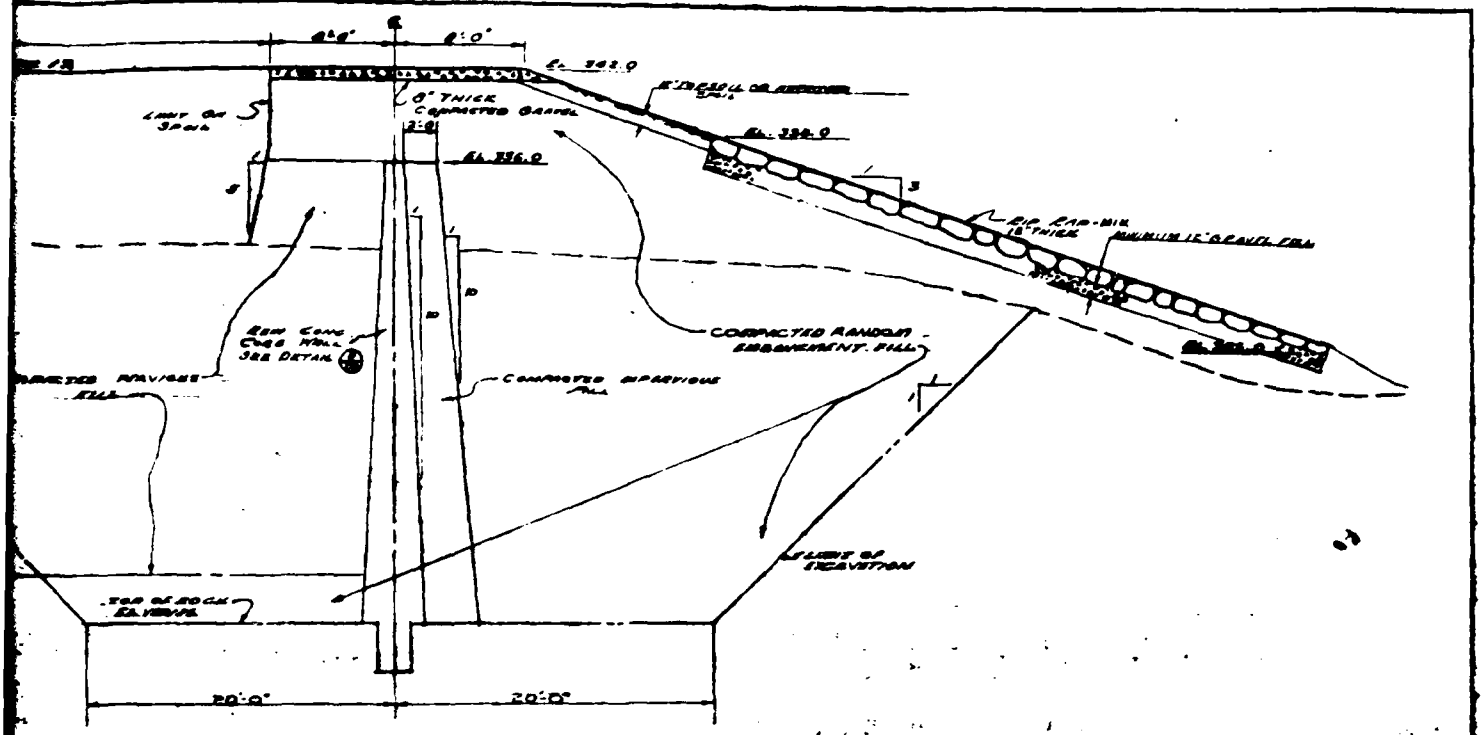

360
340
380
360
370
380
380
400
400
460
(PROTECT DURING CONSTRUCTION PERIOD)
SEE COMPANION SHEET "B" FOR EXISTING TO PROGRAMMIX
BANGSITE - FINISH GRADES
SPRING BROOK RESERVOIR & DAM
PUBLIC UTILITIES COMMISSION
WATER DIVISION
WALLINGFORD, CONN.
THE HENRY SOUTHER ENGINEERING CO.
11 LAUREL ST. HARTFORD, CONN.
B-5


TOP OF DAM EL. 342.00±

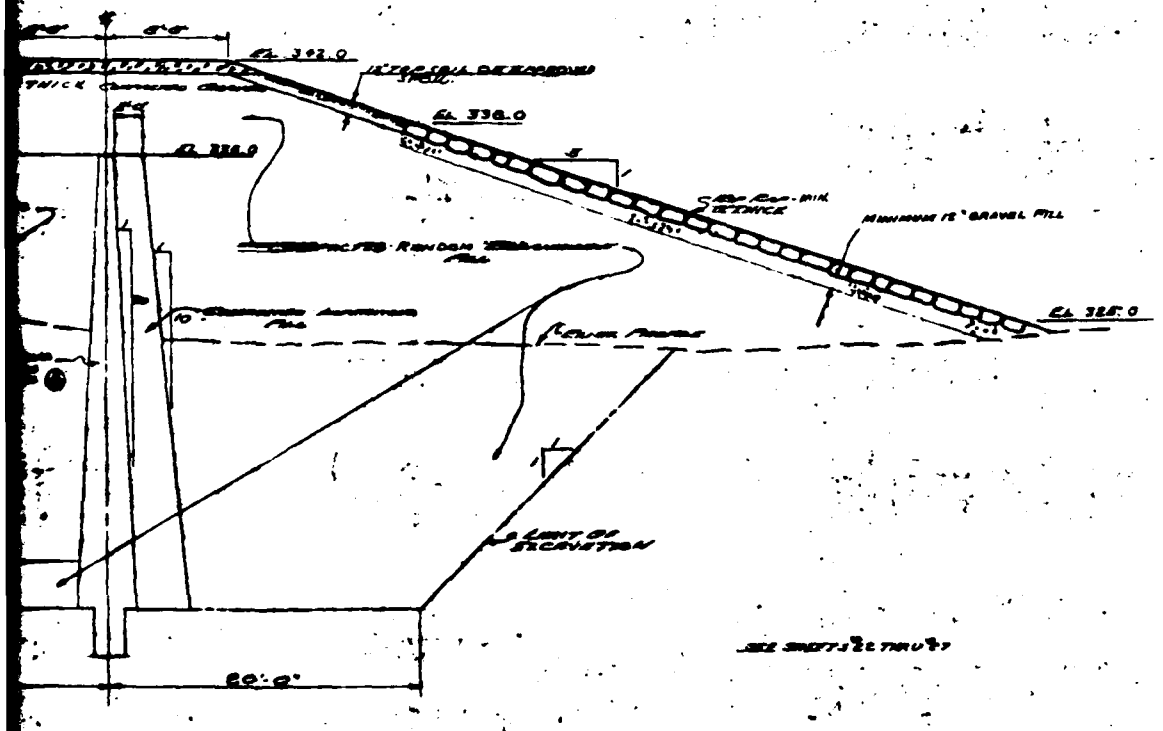

SPILLWAY
EL. 333.0
HORIZONTAL CONSTRUCTION JOINTS
SEE DETAIL
VERTICAL CONSTRUCTION
JOINTS 75' O.C. SEE
DETAIL
SCALE 1" = 80' HORIZ.
1" = 8' VERT.
THE FOLLOWING
BE FOLLOWED:
3. MAXIMUM VERTICAL POUR 10 FEET
5. MINIMUM TIME BETWEEN ADJACENT POURS 7 DAYS
DAM PROFILE
AS SHOWN
SPRING BROOK RESERVOIR & DAM
PUBLIC UTILITIES COMMISSION
WATER DIVISION
WALLINGFORD, CONN.
THE HENRY SOUTHER ENGINEERING CO.
HARTFORD, CONN.
SHEET 13

B-6


CONNECTED RAVINES
TYPICAL SECTION
PREVIOUS
TOP OF ROCK
TYPICAL SECTION STA 7+00 TO



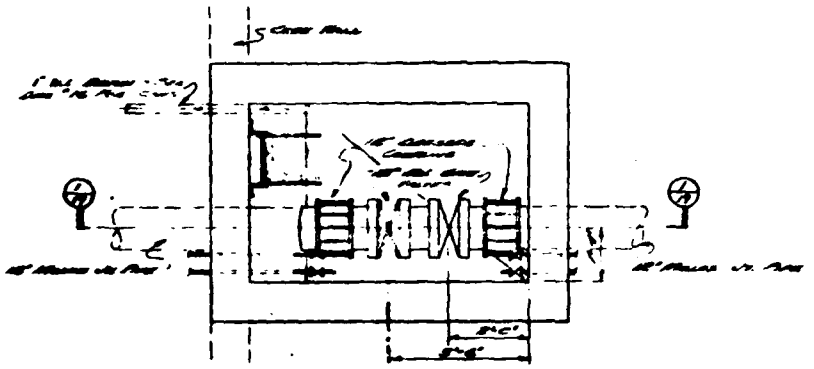
Typical Section Sta. 0+50 to Sta. 6+50



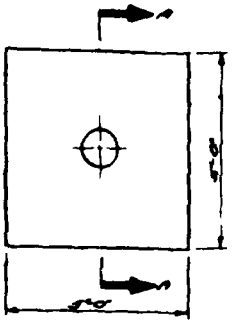
Sta 7+00 to Sta 18+90

TYPICAL CROSS-SECTIONS

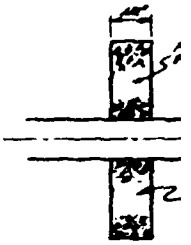
DATE 4-24-68	SCALE 1"=8'	SPRING BROOK RESERVOIR & DAM
REVISIONS 5-1-68	JOB NO.	PUBLIC UTILITIES COMMISSION
	FILE NO. 21	WATER DIVISION
	DR. BY	WALLINGFORD, CONN.
	CK. BY	THE HENRY SOUTHER ENGINEERING CO.
		11 LAUREL ST. HARTFORD, CONN.
	APPROVED	B-1
		SHEET 14 OF 40 SHEETS



VALVE PLAN

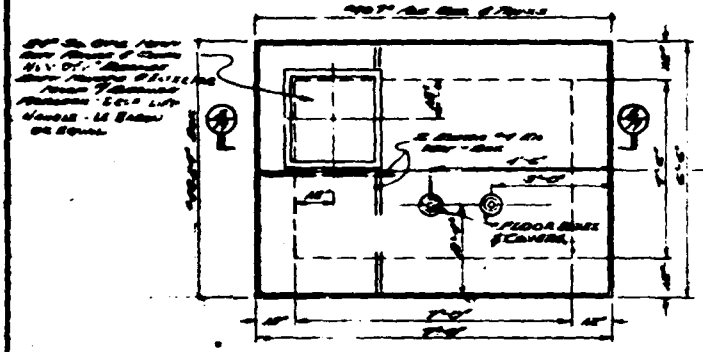


ELEVATION

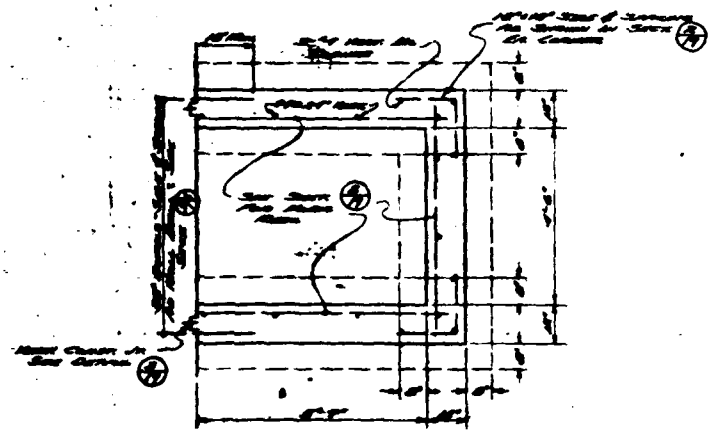


SECTION

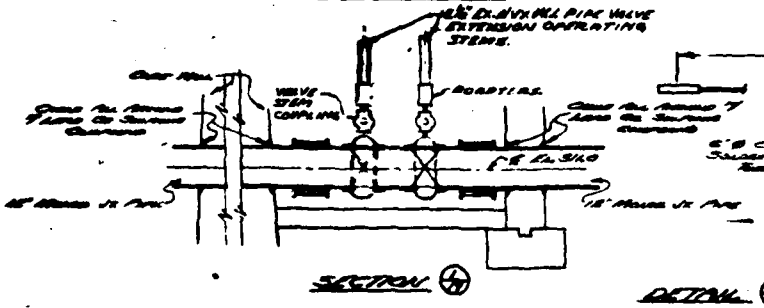
DETAIL
CURB COLLAR



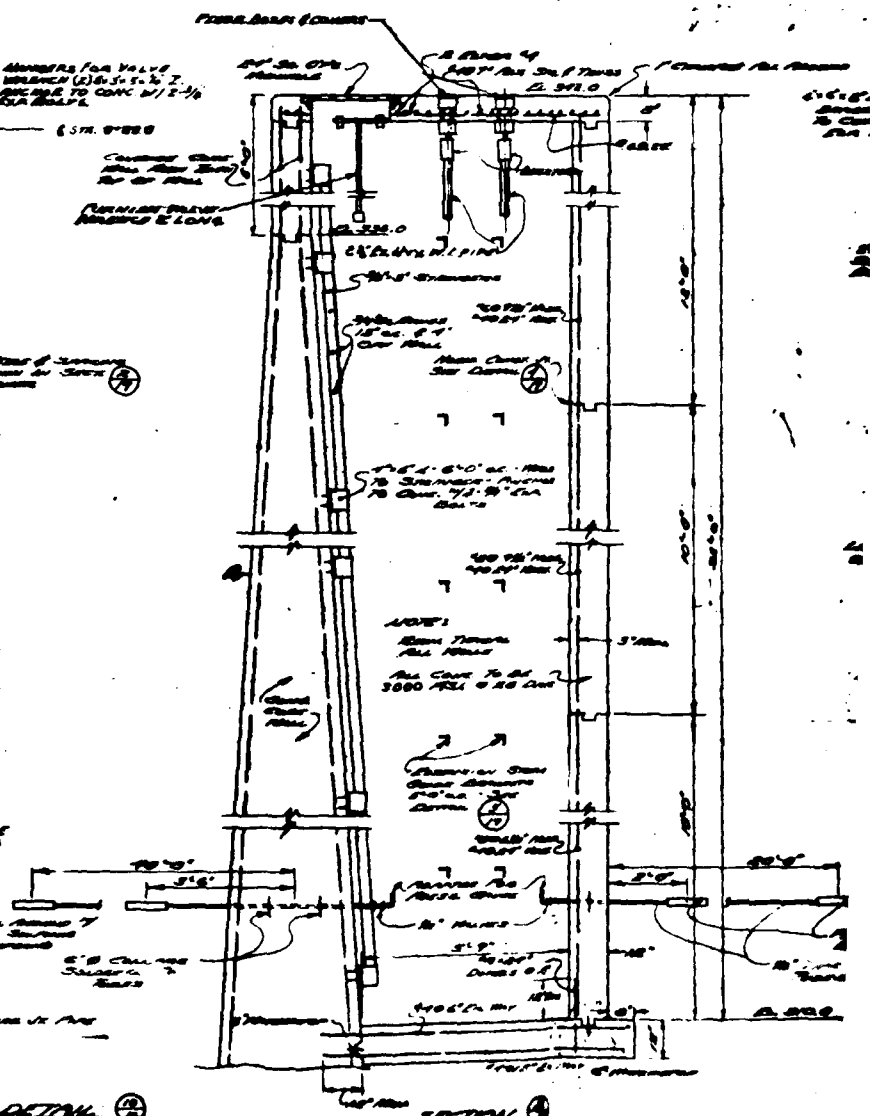
ROOF PLAN



BASE PLAN

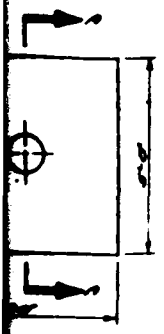


SECTION

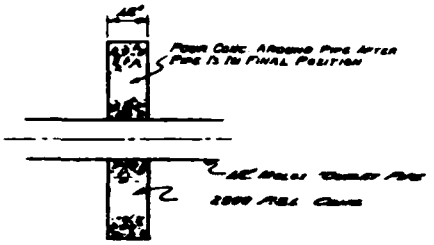


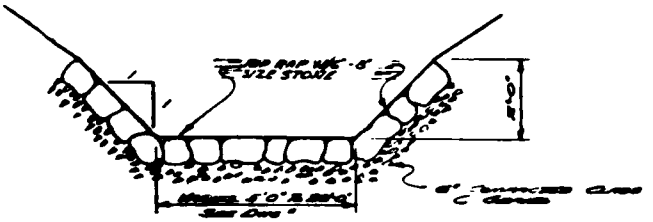
DETAIL
WALL CHANNEL

SECTION



SECTION "A-A"



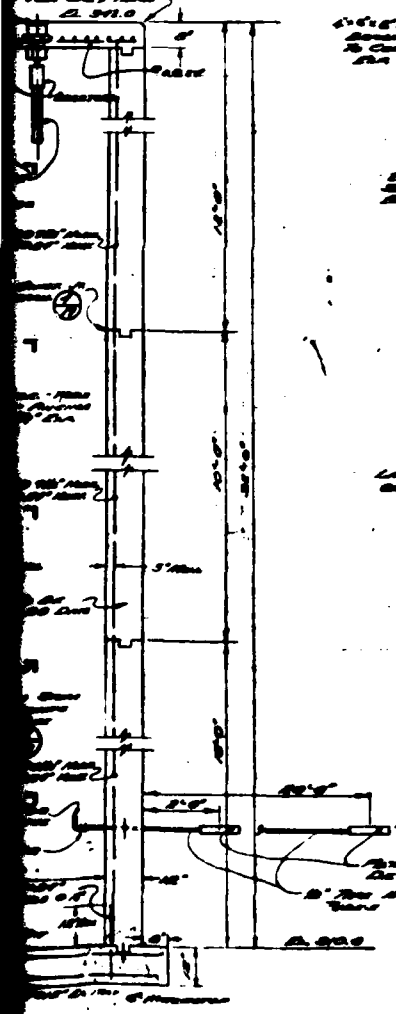


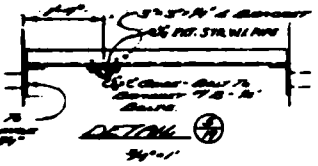
DETAIL

TYPICAL OUTLET CHANNEL SECTION

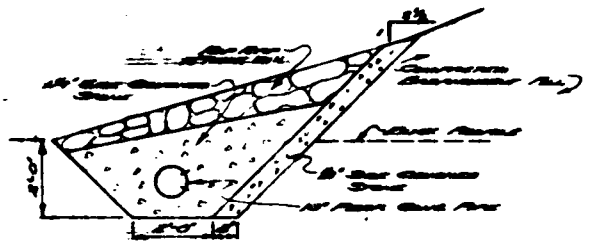
DETAIL

OUTLET COLLAR



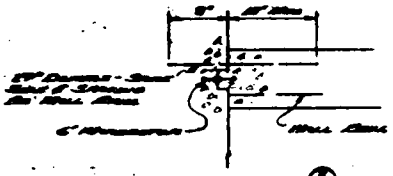


DETAIL



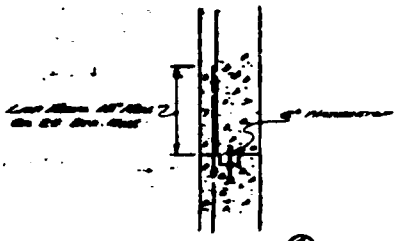
DETAIL

TYPICAL TOE DRAIN



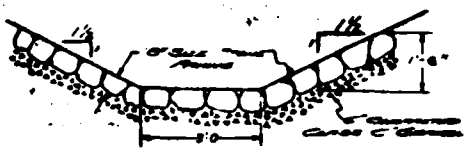
DETAIL

HORIZONTAL CONSTRUCTION JT.



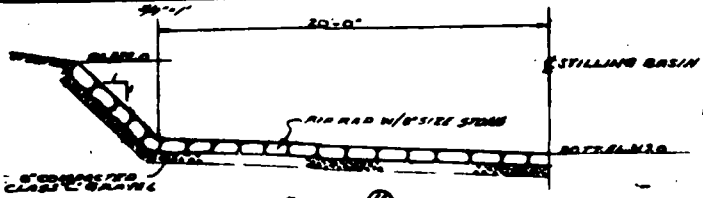
DETAIL

HORIZONTAL CONSTRUCTION JT.



DETAIL

CHANNEL TO PAUG POND

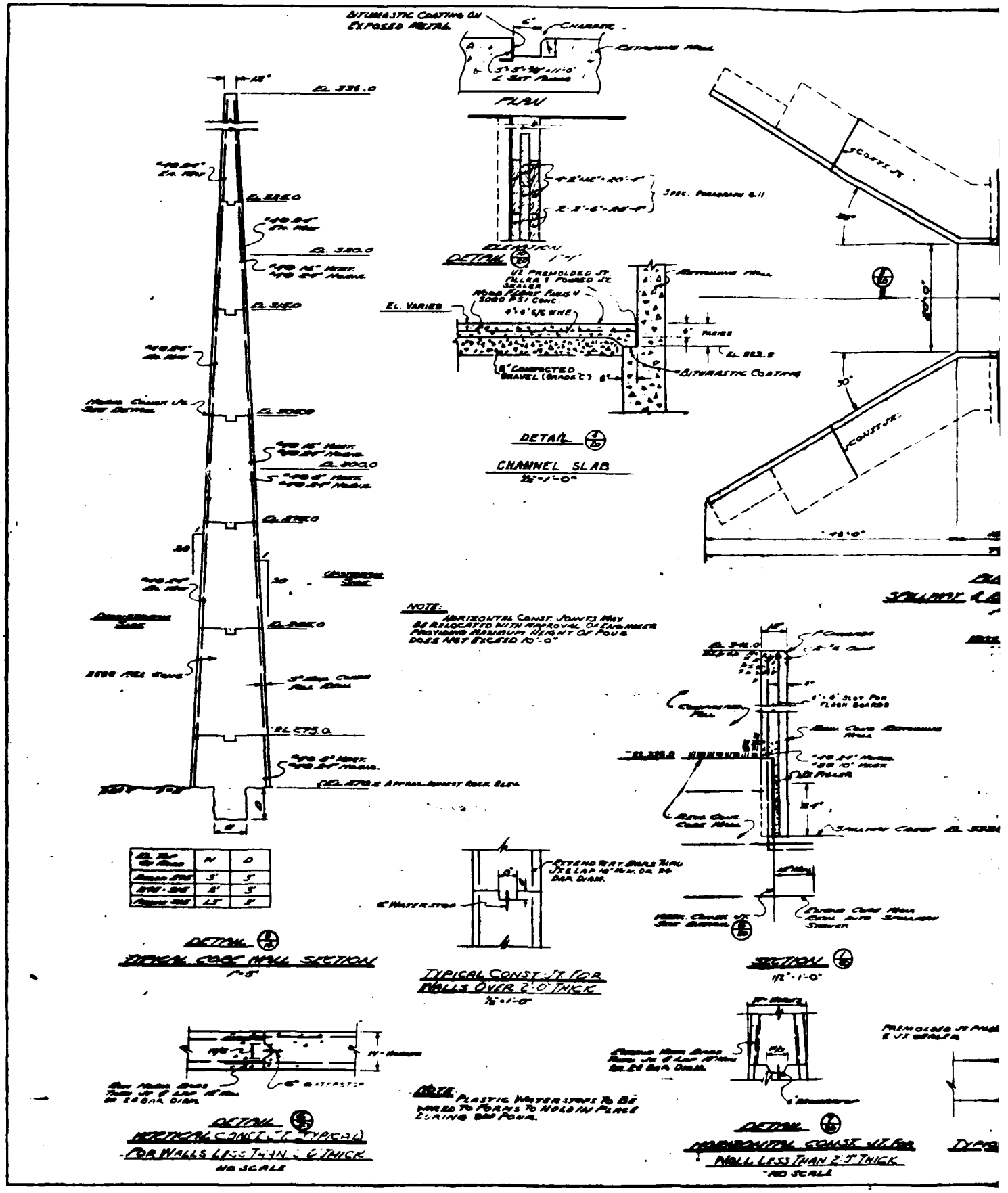


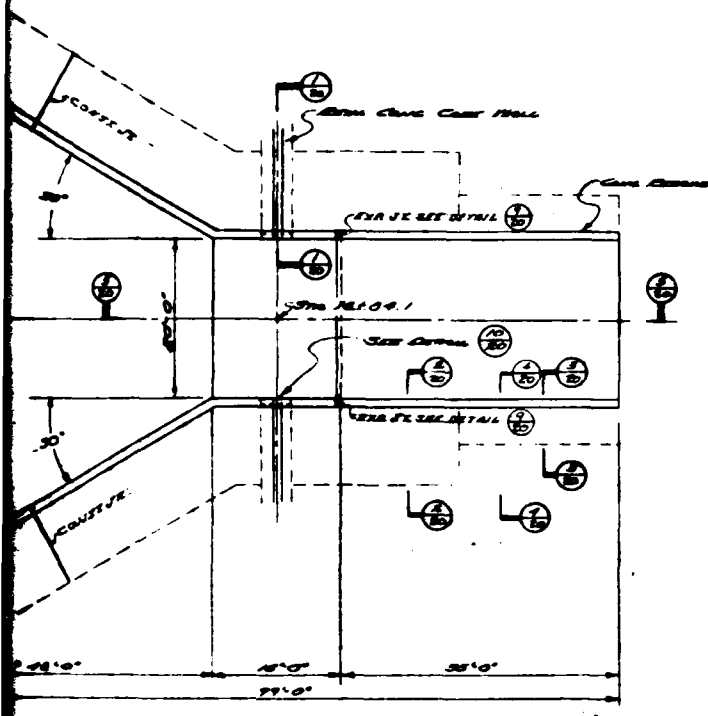
DETAIL

HALF SECTION THRU STILLING BASIN

VALVE CHAMBER, TOE DRAIN, CHANNEL & CUTOFF COLLAR DETAILS

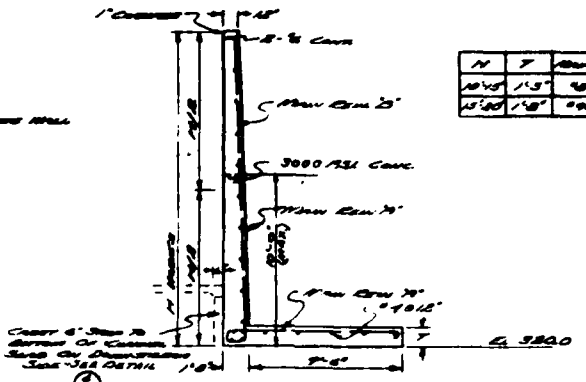
DATE 11-21-61	SCALE AS SHOWN	SPRING BROOK RESERVOIR & DAM	
REVISIONS	JOB NO.	DR. BY R.C.	PUBLIC UTILITIES COMMISSION
2-1-62	FILE NO. B-1	CH. BY MB	WATER DIVISION
			WALLINGFORD, CONN.
	THE HENRY SOUTHER ENGINEERING CO.		
	11 LAUREL ST., HARTFORD, CONN.		
	APPROVED	B-8	SHEET 18 OF 40 SHEETS


BITUMASTIC COATING ON EXPOSED METAL
PLAN
DETAIL
DETAIL
CHANNEL SLAB
NOTE:
HORIZONTAL CONST. JOINTS MAY BE RELOCATED WITH APPROVAL OF ENGINEER PROVIDING MAXIMUM HEIGHT OF POUR DOES NOT EXCEED 10'-0"
DETAIL
TYPICAL CONST. JT FOR WALLS OVER 2'-0" THICK
SECTION
DETAIL
VERTICAL CONST. JOINT (TYPICAL) FOR WALLS LESS THAN 2'-0" THICK
NO SCALE
NOTE: PLASTIC WATER STOPS TO BE WIRED TO FORMS TO HOLD IN PLACE DURING CONCRETE POUR.
DETAIL
HORIZONTAL CONST. JT FOR WALL LESS THAN 2'-0" THICK
NO SCALE

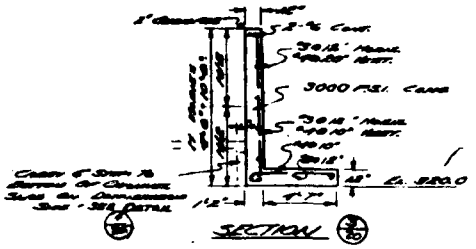


PLAN
SPILLWAY & RETAINING WALLS
1"=10'

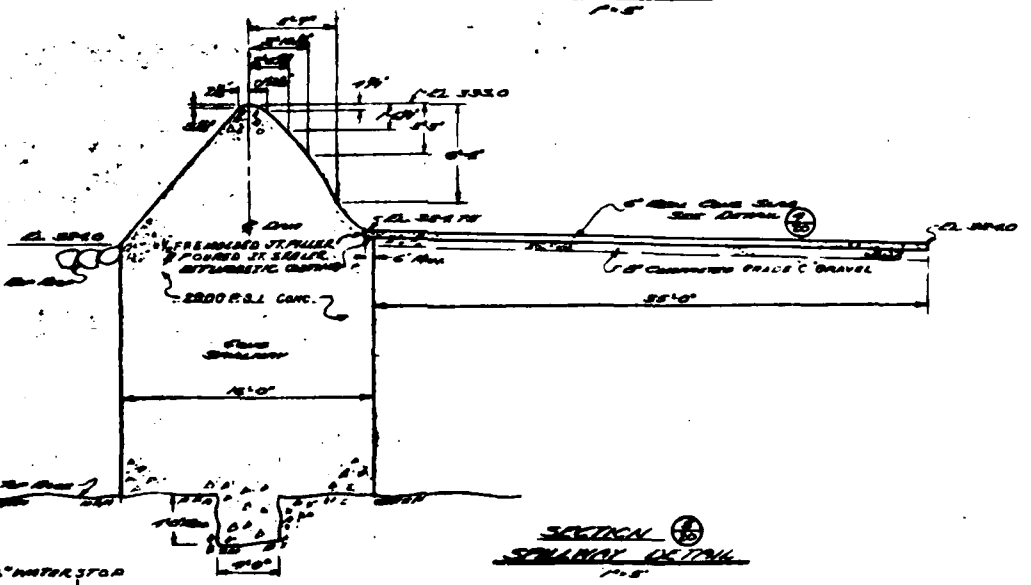
NOTE: ALL RETAINING WALL REIN. TO HAVE 3" MIN. COVER



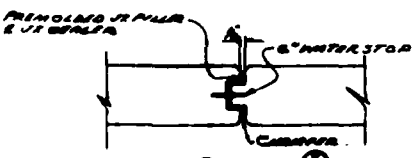
SECTION
RETAINING WALL TOP EL. 330.0 TO 332.0
1"=5'



SECTION
RETAINING WALL TOP EL. 326.0 TO 330.0
1"=5'



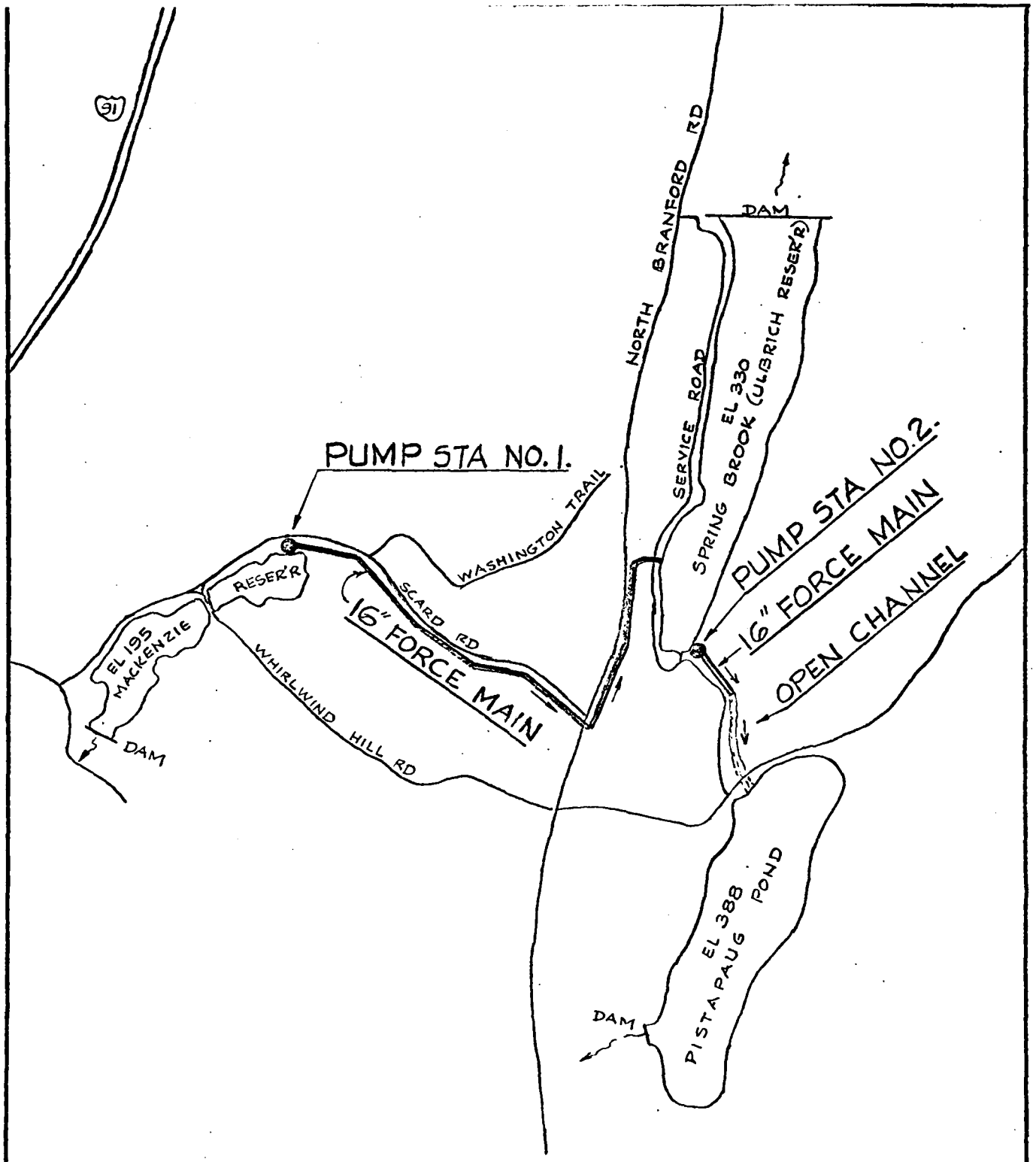
SECTION
SPILLWAY CREST
1"=5'



DETAIL
TYPICAL EXPANSION JT.
NO SCALE

SPILLWAY & CORE WALL DETAILS

DATE 10-20-64	SCALE As Shown	SPRING BROOK RESERVOIR & DAM	
REVISIONS	DES. BY S.C.	PUBLIC UTILITIES COMMISSION	
12-17-64	DR. BY S.C.	WATER DIVISION	
	FILE NO. 21	CK. BY AD	WALLINGFORD, CONN.
	THE HENRY SOUTHER ENGINEERING CO.		
	11 LAUREL ST. HARTFORD, CONN.		
	APPROVED B4		SHEET 20 OF 40 SHEETS



INTERBASIN TRANSFER SYSTEM

WALLINGFORD WATER CO.

N

0 2000 4000 FT

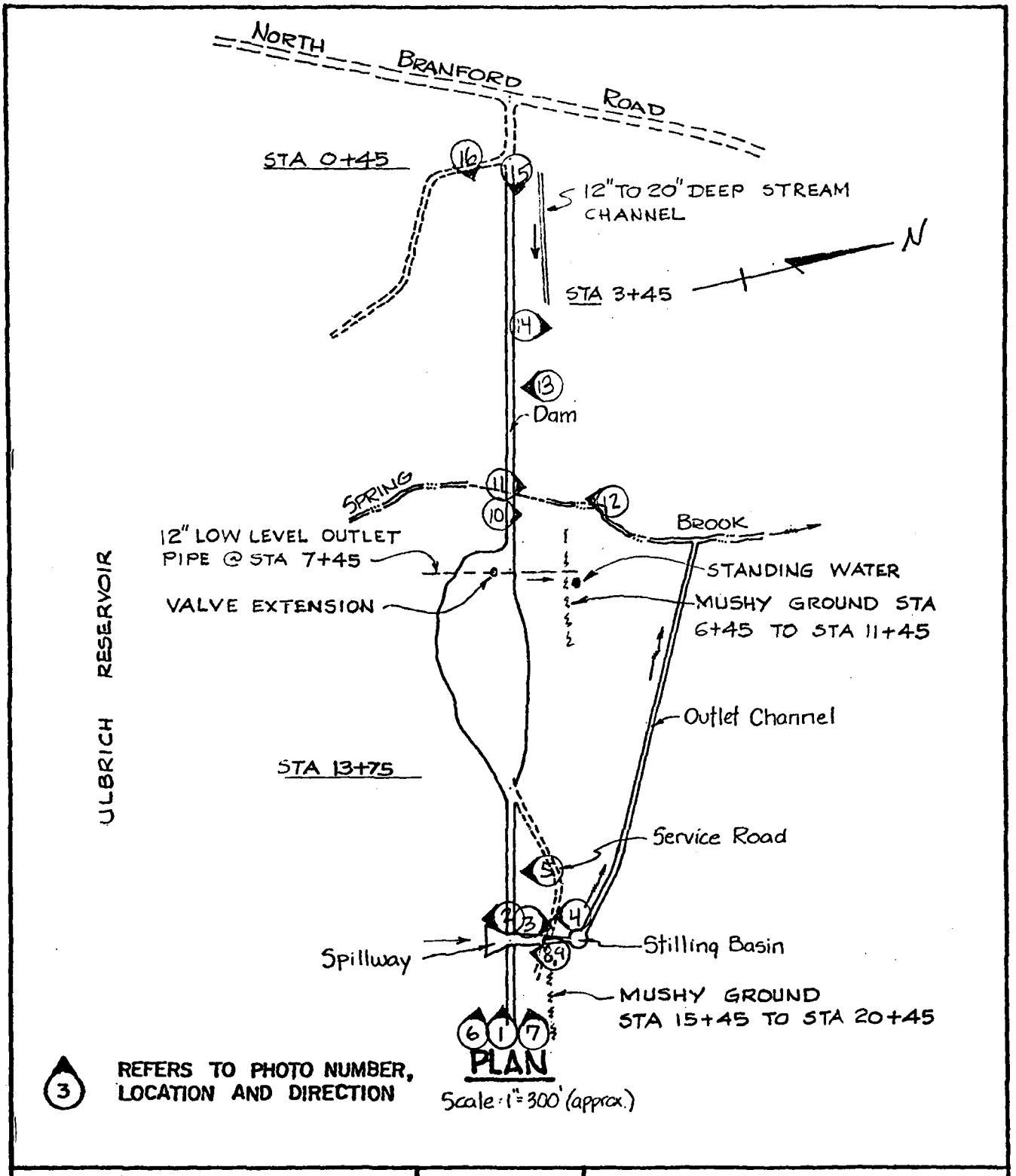
SCALE

WALLINGFORD & DURHAM QUAD

PHILIP W. GENOVESE & ASSOCIATES, INC. ENGINEERS HAMDEN, CONNECTICUT	ULBRICH RESERVOIR DAM (CT00038)

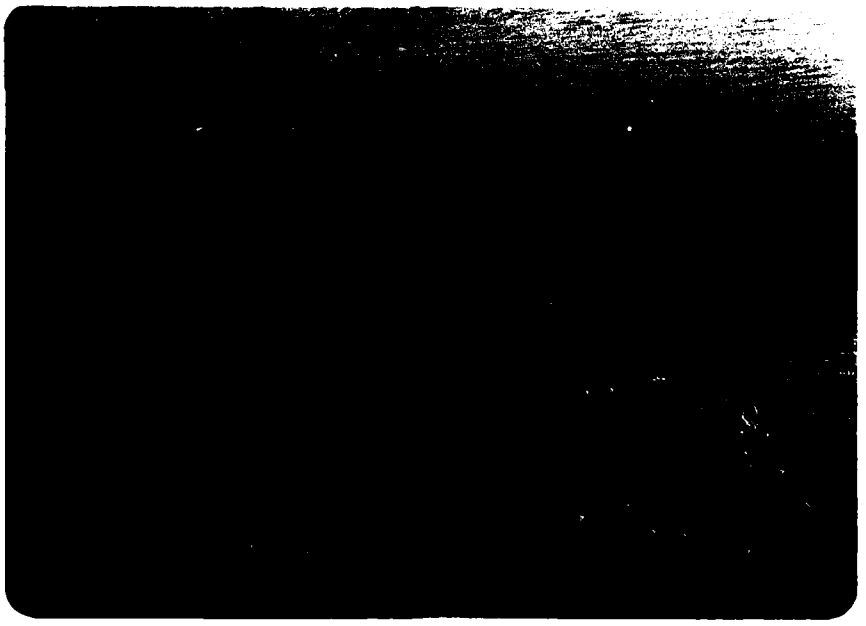
APPENDIX C

PHOTOGRAPHS



U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS	PHOTO LOCATION PLAN
PHILIP W. GENOVESE AND ASSOCIATES, INC. ENGINEERS - HAMDEN, CT.		ULBRICH RESERVOIR DAM SPRING BROOK WALLINGFORD, CONNECTICUT

1. Crest of dam left of spillway looking toward left abutment from Sta 17 + 45.



2. Upstream slope and riprap adjacent to left training wall of spillway.

3. Discharge channel of spillway and bridge spanning channel from left downstream training wall of spillway.

4. 10-inch-diameter concrete pipe in toe drain outlet on left side of spillway discharge channel.

5. View of riprap covering toe drain extending right of spillway at Sta 16 + 95.

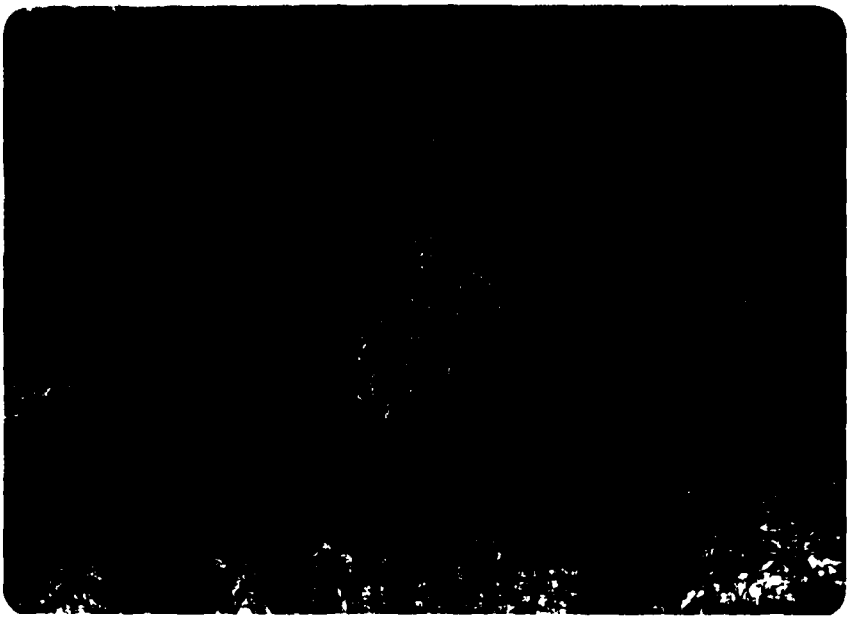
6. View of grass and brush growing in riprap on upstream slope right of spillway at Sta 18 + 95.

7. Crest of dam looking toward left abutment from right abutment.

8. Downstream slope and toe of dam left of spillway from bridge over spillway discharge channel.

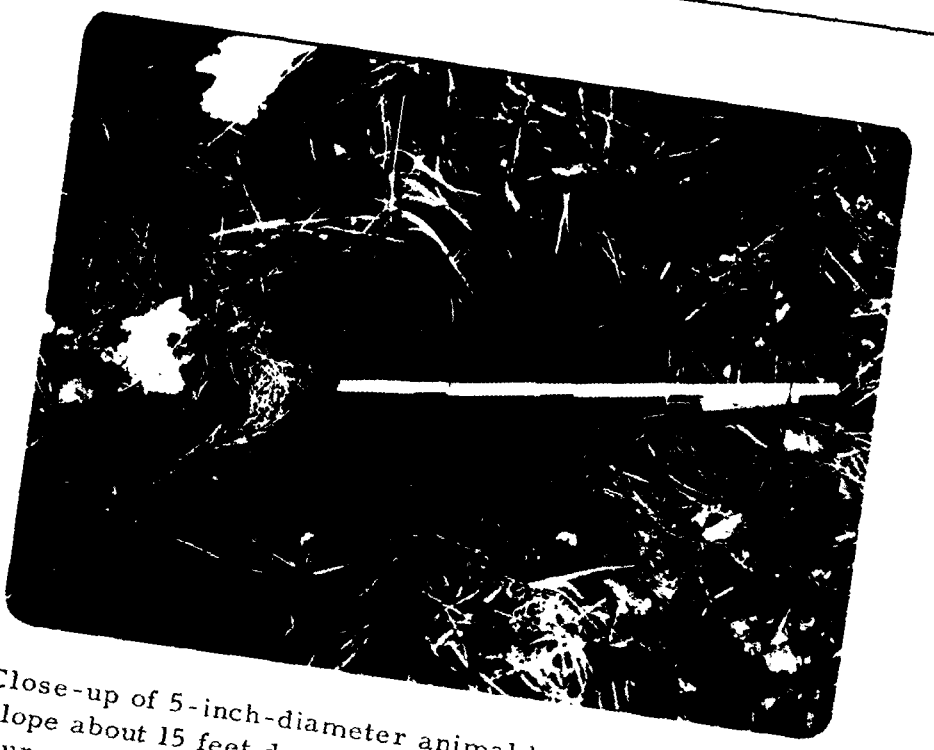
9. Spillway and discharge channel from bridge over discharge channel.

10. Close-up of 3-inch-diameter tree and brush growing on downstream slope at Sta 8 + 45.

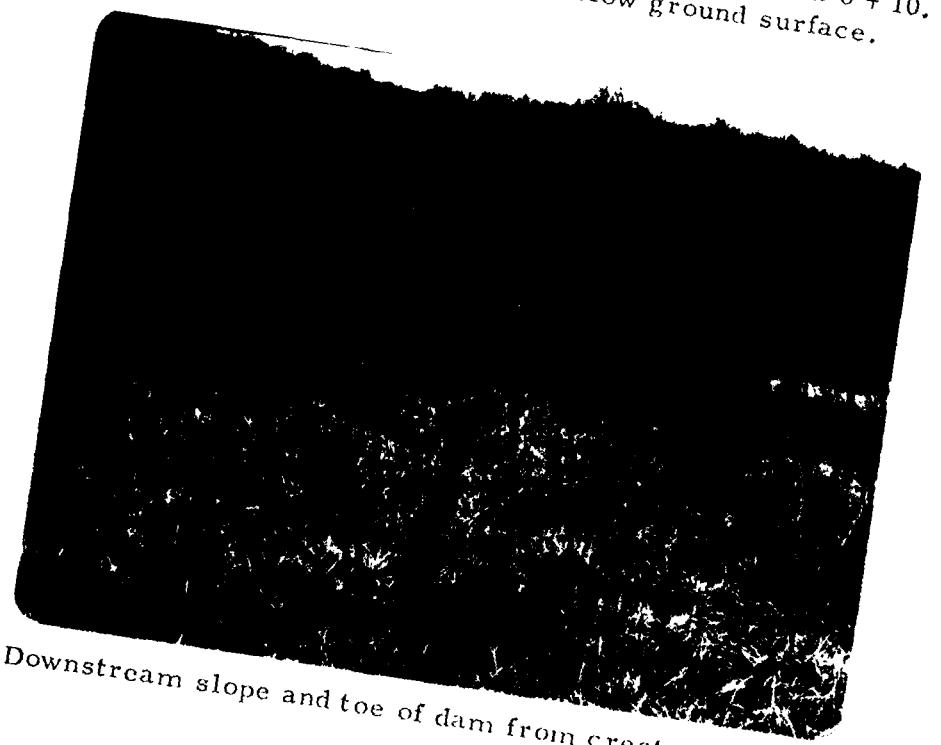


11. Natural stream bed forming outlet channel viewed from downstream slope at Sta 7 + 45.

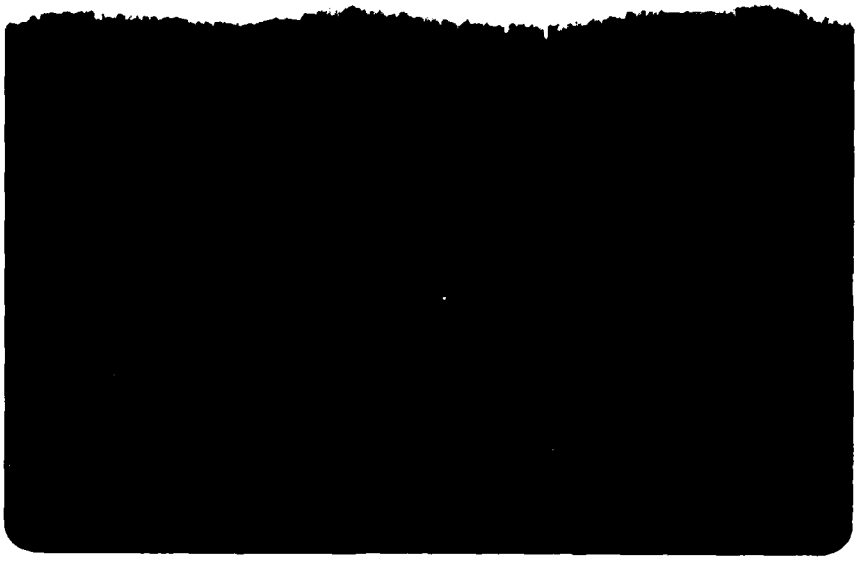
12. Toe drain outlet into right side of outlet channel at toe of downstream slope at Sta 7 + 45.



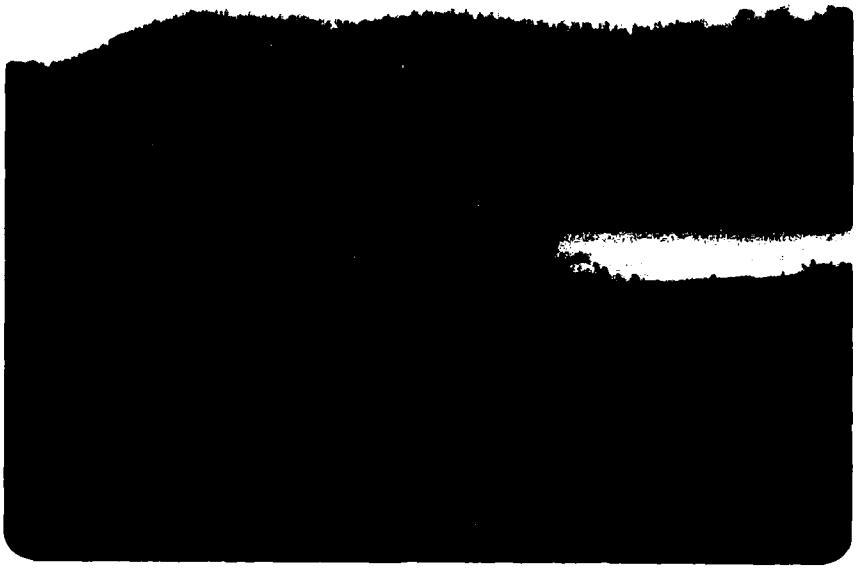
13. Close-up of 5-inch-diameter animal burrow on downstream slope about 15 feet downstream from crest at Sta 6 + 10. Burrow extends at least 1 foot below ground surface.



14. Downstream slope and toe of dam from crest at Sta 4 + 45.



15. Crest of dam looking toward right abutment from Sta 3 + 45.

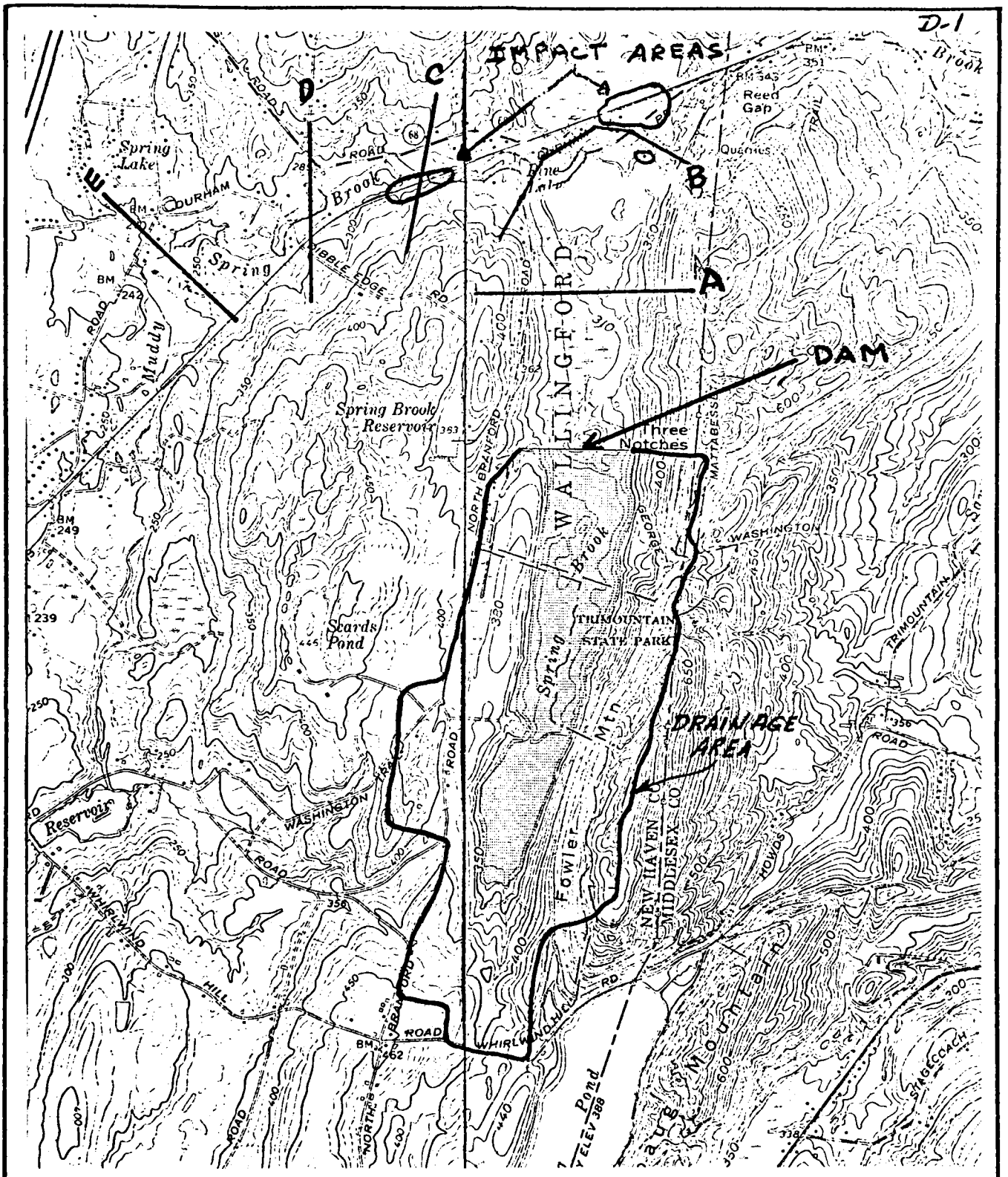


16. Upstream slope of dam from left abutment looking toward right abutment. Note portions of upstream slope in left foreground covered with wood chips.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

D-1



DRAINAGE & IMPACT AREA

WALLINGFORD & DURHAM QUAD

DRAINAGE AREA = 0.95 SQ. M.

PHILIP W. GENOVESE & ASSOCIATES, INC.
ENGINEERS HAMDEN, CONNECTICUT

ULBRICH RESERVOIR DAM (CT00038)

PROJ. NO. [illegible]4103
DESCRIPTION Ulbrich Reservoir Dam
[illegible], CT.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

BY [illegible] DATE [illegible]
CHKD. BY [illegible] DATE 3/3/[illegible]

Hydrologic/Hydraulic Computations
Ulbrich Reservoir Dam

Size Classification;

Surface Area = 15[illegible].7 ac., Drainage Area = 0.95 mi²

Top of Dam = elev. 342.0
Downstream L.P. = elev. 325.0
Height of Dam = 17.0 feet

See engineering data supplied by Wallingford Water in Appendix B

Storage (S) = 2980 ac-ft (top of spillway)

S = 4091 ac-ft (top of dam)

∴ the size of the dam is INTERMEDIATE, but tending towards small. There are several homes downstream that could potentially be affected by a dam break as well as a railroad bridge approx. 6400 ft. downstream. For these reasons a hazard potential classification of HIGH is chosen. A spillway design flood (SDF) equal to the probable maximum flood (PMF) is required for this combination of size and hazard potential.

For rolling terrain the PMF in cfs/mi² will be taken as 2150 (the min. value on the chart corresponding to a min. drainage area of 2 mi²). Therefore the test flood will be:

$SDF = PMF = (2150\ cfs/mi^2)(0.95\ mi^2)$

$SDF = 2043$

Volume of SDF = 53.3 ac-ft/[illegible] (0.95 mi²)(19") [illegible]

V = [illegible]2.1 [illegible]

PROJ. NO. 80410 | GENOVESE AND ASSOCIATES | SHEET NO. 03 OF 20
DESCRIPTION Ulbrich Reservoir Dam, Wallingford, Conn. | CONSULTING ENGINEERS, HAMDEN, CONN. | BY TKC DATE 12/1/
CHKD. BY WJO DATE 2/3/9

Ulbrich Reservoir Dam

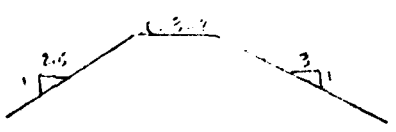
Using the weir formula ($Q = CLH^{3/2}$) with appropriate C values, stage-discharge data can be calculated.

With Flash Board

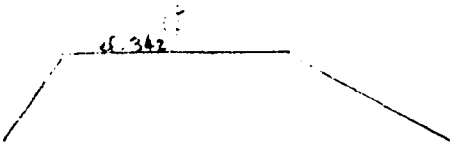
ELEV	H_1	H_2	H_3	Q_1 (C=2.8)	Q_2 (C=3.3)	Q_3 (C=2.8)	Q_{TOT}
335	–	–	–	–	–	–	–
337	–	2	–	–	186.7	–	186.7
339	–	4	–	–	528.0	–	528.0
341	–	6	–	–	970.0	–	970.0
343	1	8	1	3844.5	1493.4	1722.0	7059.9
342	–	7	–	–	1222.3	–	1222.3
340	–	5	–	–	737.9	–	737.9

Without Flash Board

ELEV	H_1	H_2	H_3	Q_1 (C=2.8)	Q_2 (C=4.0)	Q_3 (C=2.8)	Q_{TOT}
333	–	–	–	–	–	–	–
335	–	2	–	–	226.3	–	226.3
337	–	4	–	–	640	–	640.0
339	–	6	–	–	1175.8	–	1175.8
341	–	8	–	–	1810.2	–	1810.2
343	1	10	1	3844.5	2529.8	1722.0	8096.3
342	–	9	–	–	2160	–	2160
340	–	7	–	–	1491.6	–	1491.6



C = 2.75 – 3.5
L = 1165 ft



C = 2.5
L = 615 ft

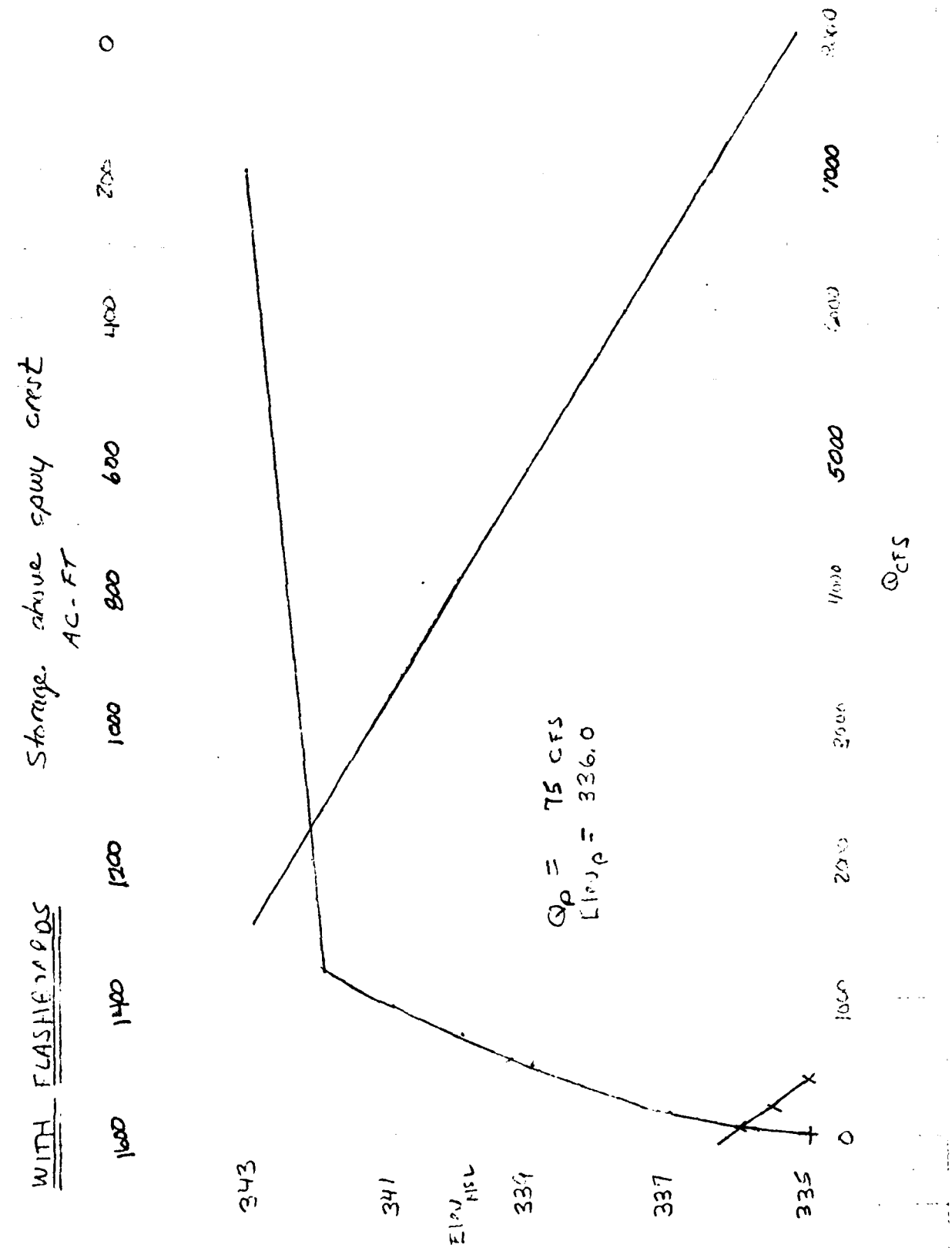
C = 3 – 4
L = 70 ft

PROJ. NO. 804103
DESCRIPTION Ulbrich Reservoir Dam; Wallingford Conn

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D4 OF 7.1
BY WJG DATE 3-7-91
CHKD. BY _____ DATE _____

Ulbrich Reservoir Dams

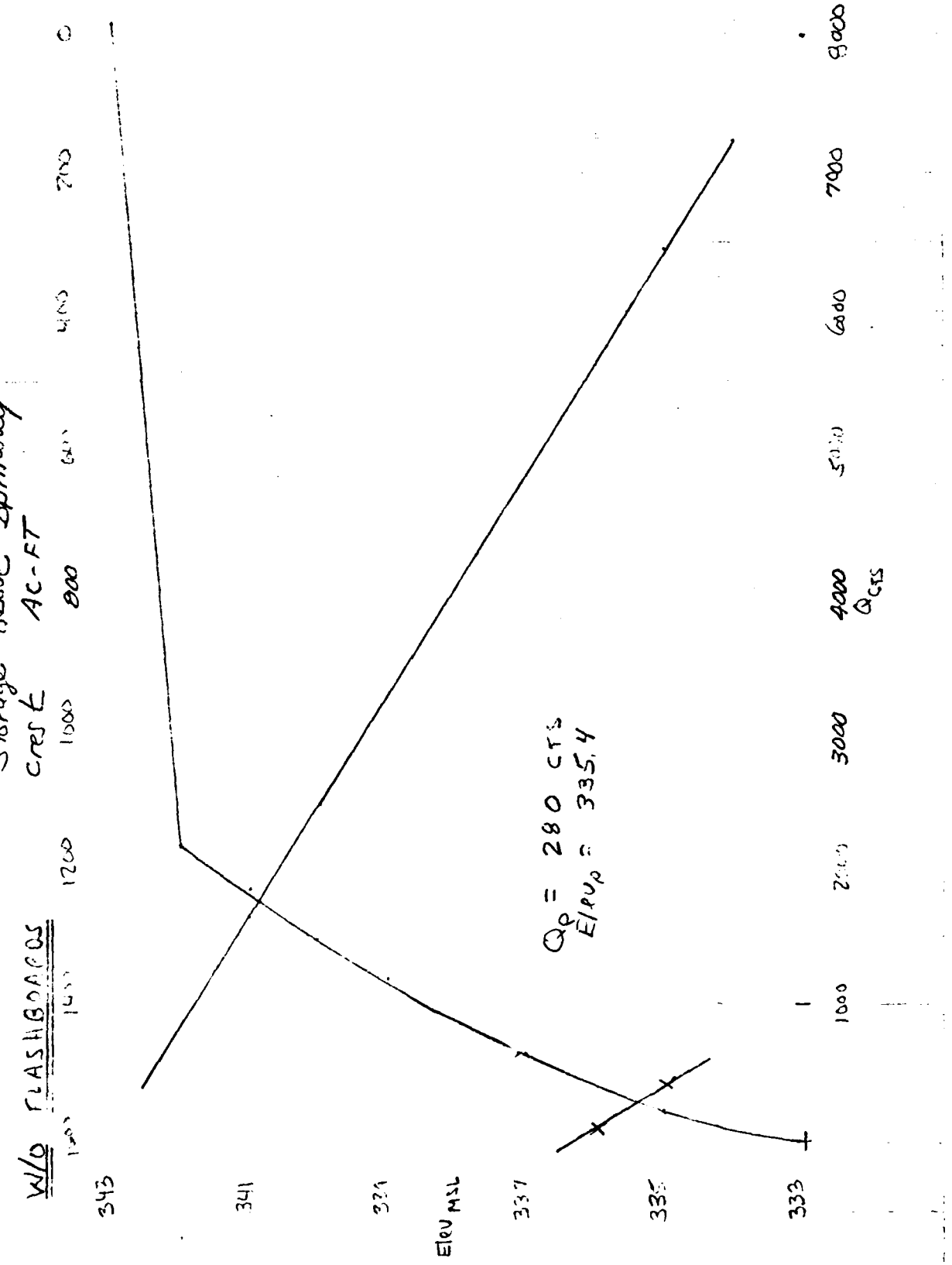


PROJ. NO. 80403
DESCRIPTION Ulbrich Reservoir Dam
Wallingford, Conn.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. 05 OF 20
BY WJG DATE 2-3-81
CHKD. BY _____ DATE _____

Ulbrich Reservoir Dam



PROJ. NO. 804103
DESCRIPTION Albrich Reservoir Dam, Wallingford, Conn

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D6 OF 20
BY TKC DATE 12/14/00
CHKD. BY WJG DATE 3-3-01

Albrich Reservoir Dam

Dam Breaching Analysis:

Stor = 3140 AC-FT
Elev$_p$ = 336.0
Flashboards In

$Q_{P1} = 8/27\ W_b \sqrt{g}\ Y_o^{3/2}$

$Q_{P1} = (8/27)(0.4)(1400)(\sqrt{32.2})(11.0)^{3/2}$

$Q_{P1} = 34,350$ cfs (plus 75 cfs spillway flow)

TOTAL $Q_{P1} = 34,425$ cfs

Section A-A (2850' d/s of dam):

$Q_{P1} = 34,425$ cfs
elev$_1$ = 319.1
$A_1 = 6400$ ft^2

$Q_{P_{sp}} = 75$ cfs
elev$_2$ = 310.2
$A_2 = 100$ ft^2

$V_{1-2} = \frac{(2850')(6,400 - 100)\text{ ft}^2}{43,560\text{ ft}^3/\text{ac}}$

$V_{1-2} = 412$ ac-ft

$Q_{P2} = Q_{P1}(1 - V_{1-2}/\text{Stor})$

$Q_{P2} = 34,425\left(1 - \frac{412}{3140}\right)$

$Q_{P2} = 29,808$ cfs (trial)
elev$_2$ = 318.5 $A_2 = 5,800$ ft^2, $V_2 = 373$ ac-ft

$Q_{P2} = 34,425\left(1 - \frac{(412 + 373)/2}{3140}\right)$

$Q_{P2} = 30,122$ cfs
elev$_2$ = 318.6

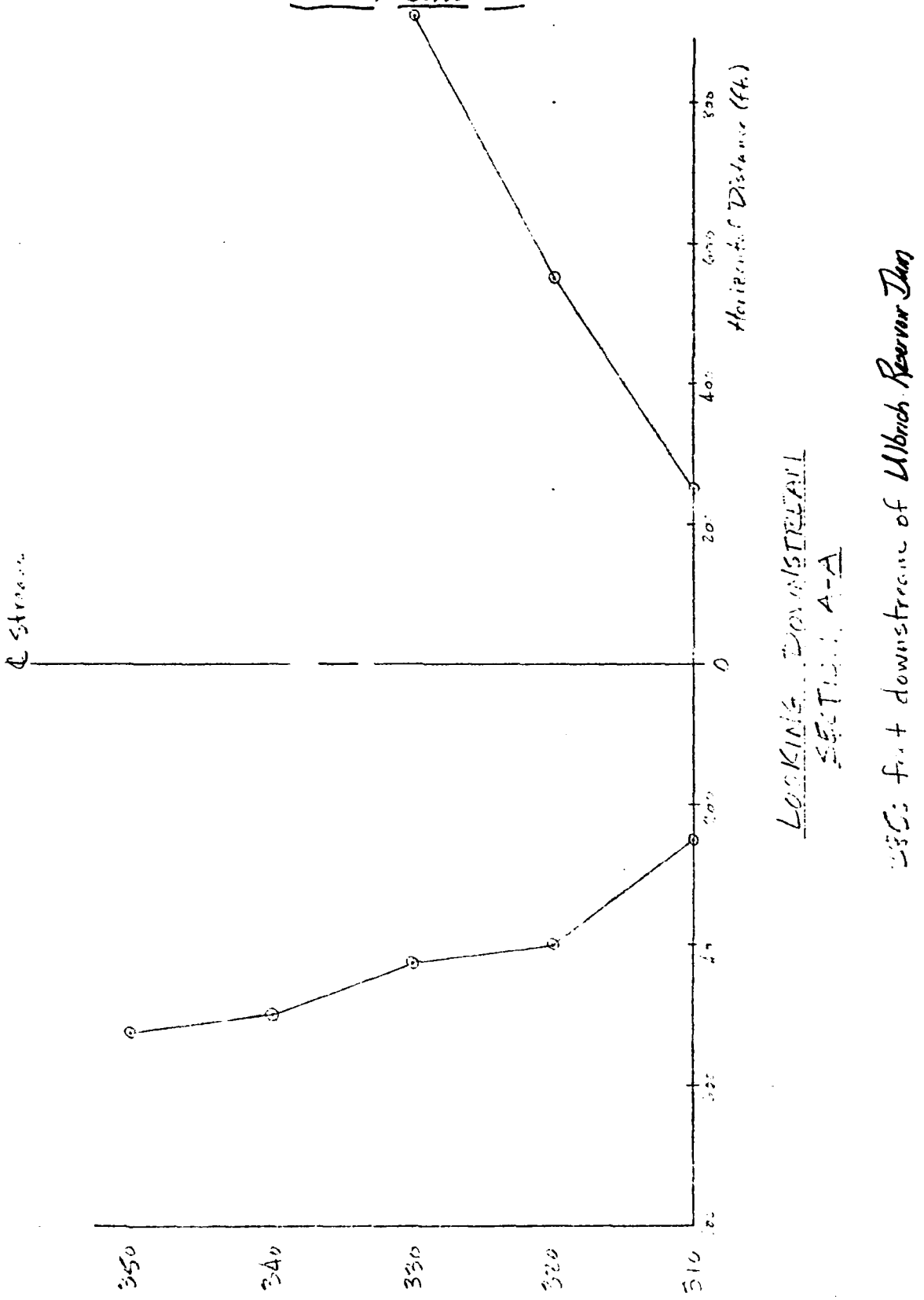
process using $Q_{P2} = 30,122$ cfs.

PROJ. NO. 501103
DESCRIPTION Ulbrich Reservoir Dam
WALLINGFORD, CT.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D 7 OF 20
BY TKC DATE 12/1/
CHKD. BY WJG DATE 3-3-

Ulbrich Reservoir Dam:



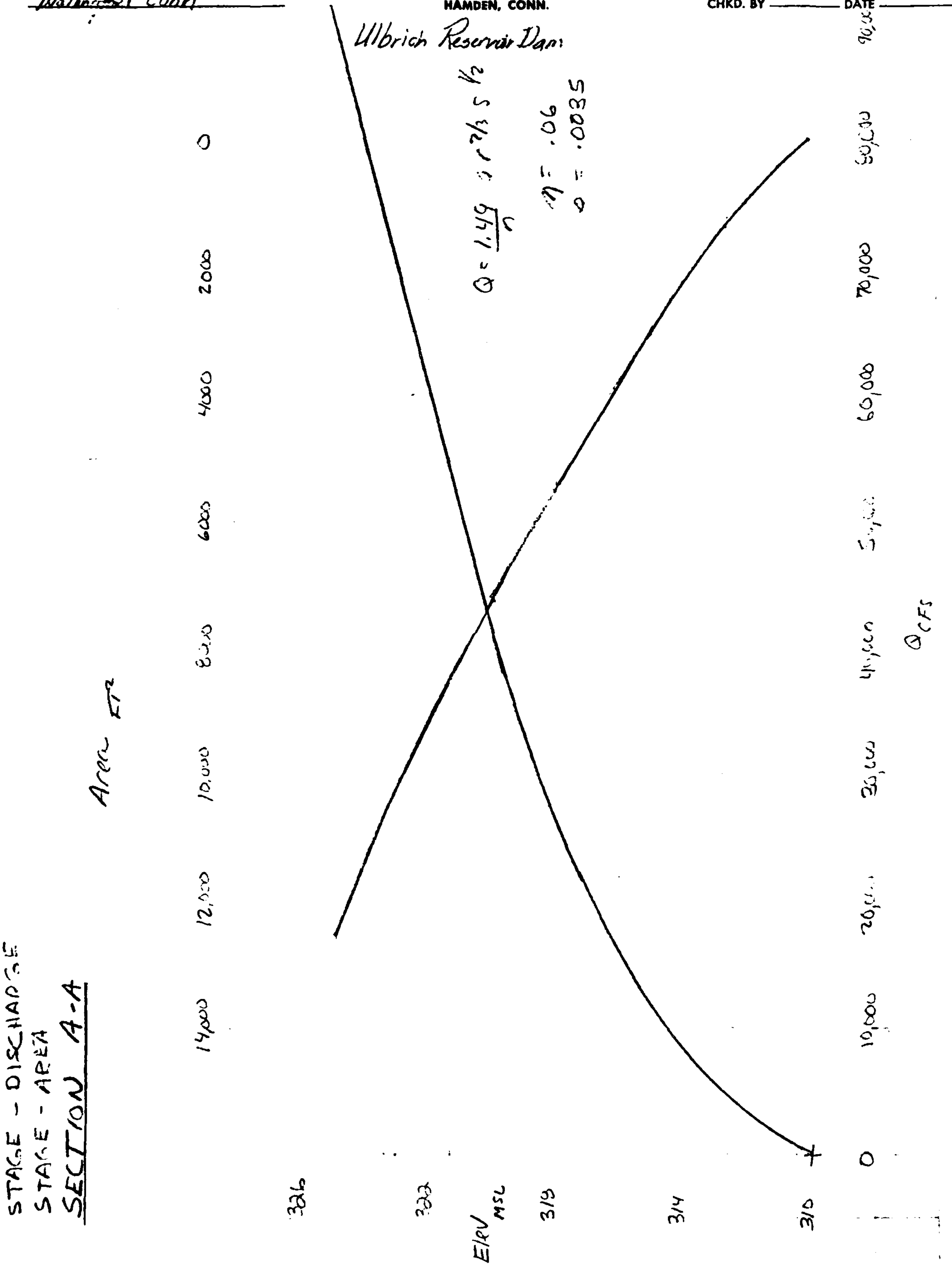
LOOKING DOWNSTREAM
SECTION A-A

USGS ft. + downstream of Ulbrich Reservoir Dam

PROJ. NO. B04103
DESCRIPTION Ulbrich Reservoir Dam Wallingford Conn

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D9 OF [illegible]
BY [illegible] DATE 3-3-[illegible]
CHKD. BY DATE



PROJ. NO. 80402
DESCRIPTION Ulbrich Reservoir Washington Conn.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D9 OF 27
BY USG DATE 3-3-81
CHKD. BY _____ DATE _____

Ulbrich Reservoir Dam

Dam Breach Analysis (cont.)

Section BB (1700' d/s of A A)

$Q_{P_2} = 30,122$ cfs $Q_{P_0} = 75$ cfs
$elev_2 = 319.8$ $elev_0 = 310.2$
$A_2 = 7,800$ $A_0 = 100$

$$V_{2-0} = \frac{(1700)(7,800 - 100)}{43,560}$$

$V_{2-0} = 300$ AC-FT

$$Q_{P_3} = 30,122\left(1 - \frac{300}{3140}\right)$$

$Q_{P_3} = 27,244$ cfs

$elev_3 = 319.3$ $A_3 = 6,800$ $V = 261$

$$Q_{P_3} = 30,122\left(1 - \frac{300 + 261}{2(3140)}\right)$$

$Q_{P_3} = 27,431$ cfs
$elev = 319.3$

Section CC (2000' d/s of BB)

$Q_{P_4} = 27,431$ $Q_{P_0} = 75$ cfs
$elev_4 = 307.4$ $elev_0 = 291.0$
$A_4 = 3700$ $A_0 = 100$

$$V_{3-4} = \frac{(2000)(3700 - 100)}{43,560} = 165 \text{ AC-FT}$$

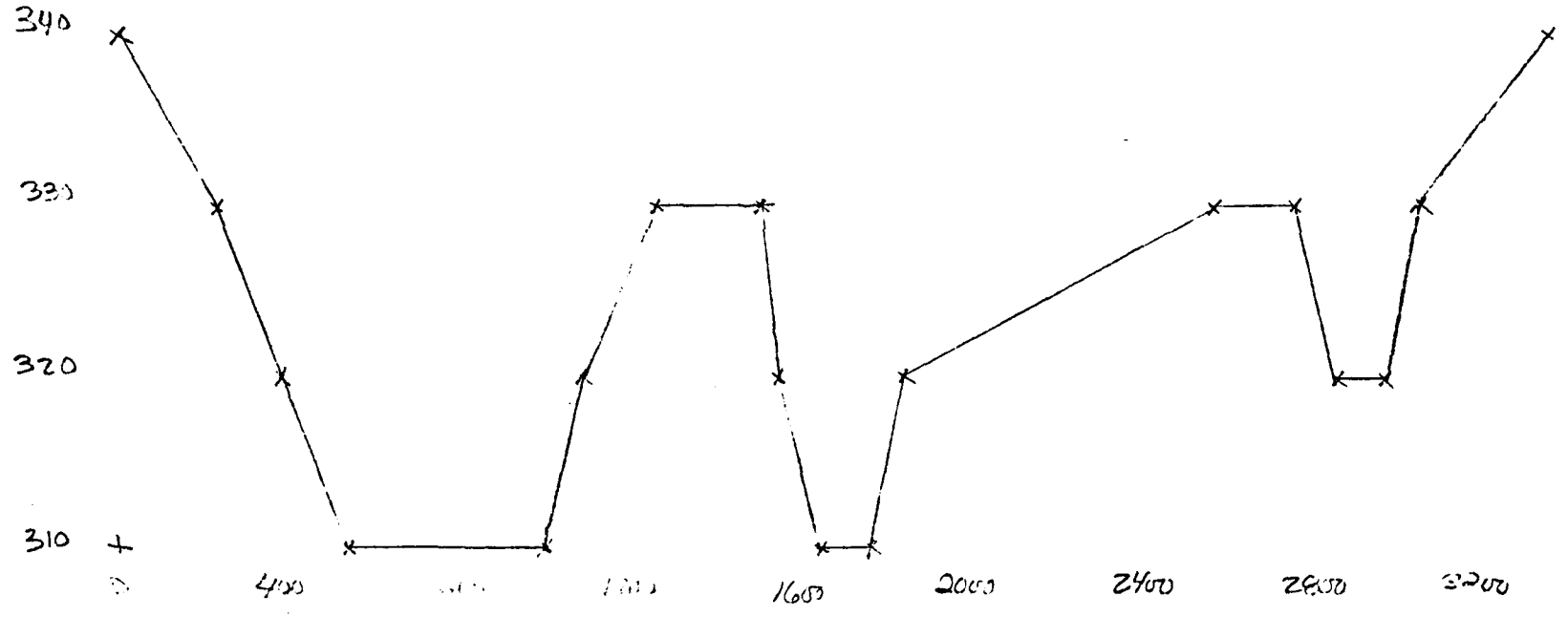
$$Q_{P_4} = 27,431\left(1 - \frac{165}{3140}\right)$$

$Q_{P_4} = 25,990$
$elev = 307.1$ $A_4 = 3650$ FT² $V = 163$ AC-FT

PROJ. NO. 804103 DESCRIPTION Upper Quinnipiac Dr. Wallingford, Conn.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D/S OF 20
BY WNG DATE 3-3-81
CHKD. BY _____ DATE _____



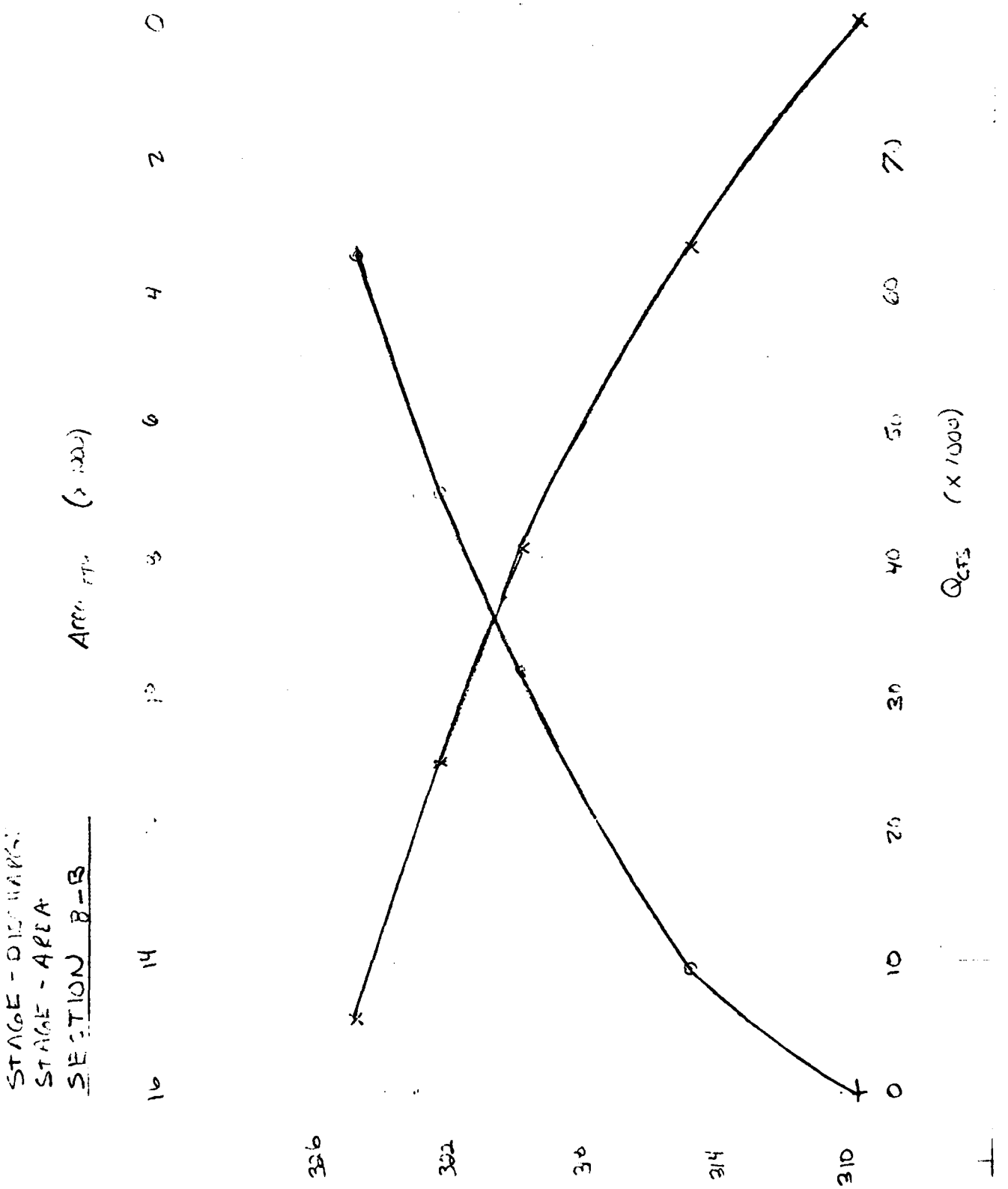
LOOKING D/S
SECTION B-B

1700' D/S OF A-A
450' D/S OF DAM

PROJ. NO. 804103
DESCRIPTION Ulbrich Retention Dam
Wallingford, Conn

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D11 OF 20
BY [illegible] DATE [illegible]
CHKD. BY _____ DATE _____

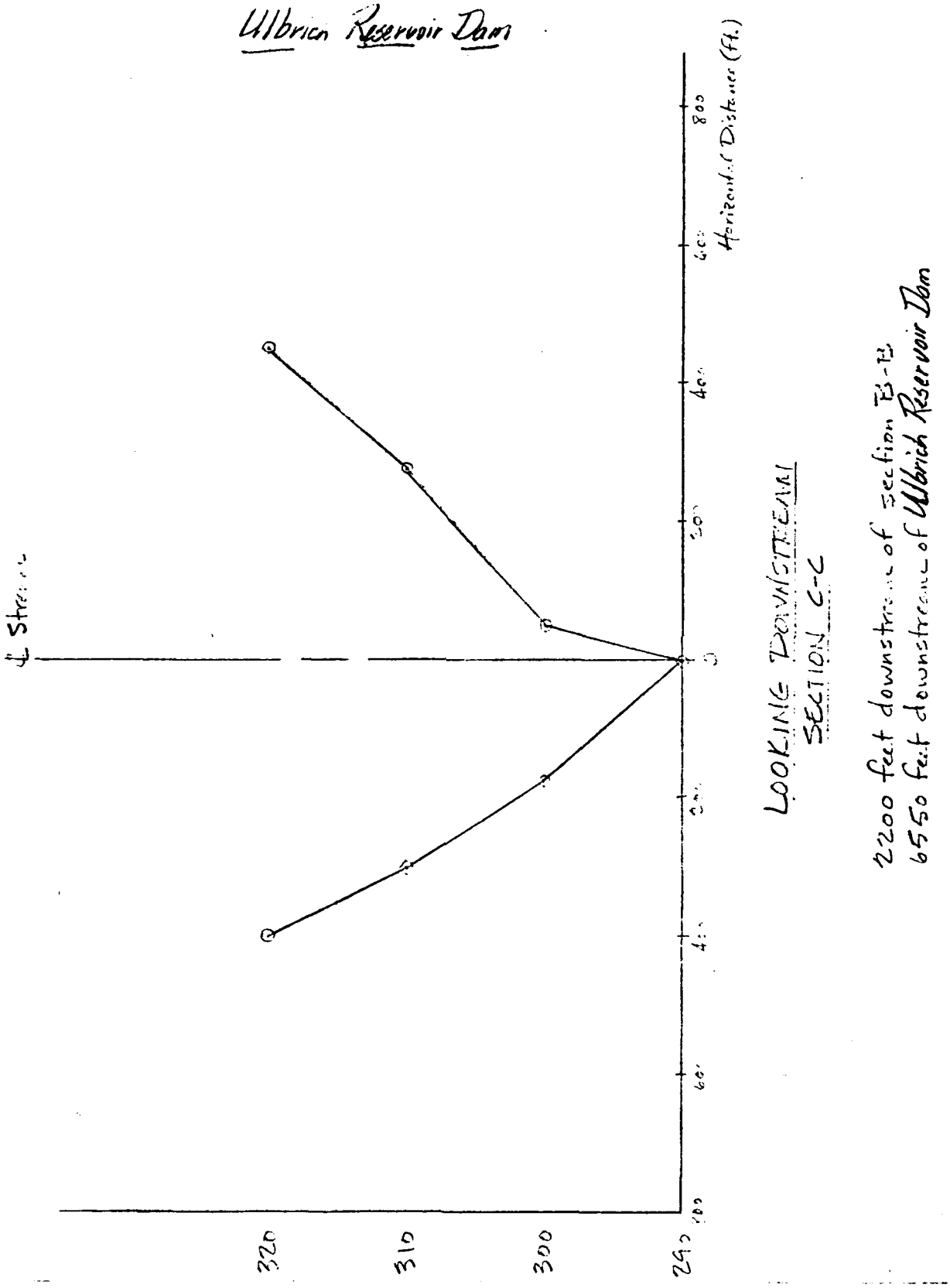


PROJ. NO. [illegible]
DESCRIPTION Ulbrich Reservoir Dam
Wallingford, Conn.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D12 OF 20
BY TKC DATE 12/1/80
CHKD. BY WJG DATE 3-3-81

Ulbrich Reservoir Dam



LOOKING DOWNSTREAM
SECTION C-C

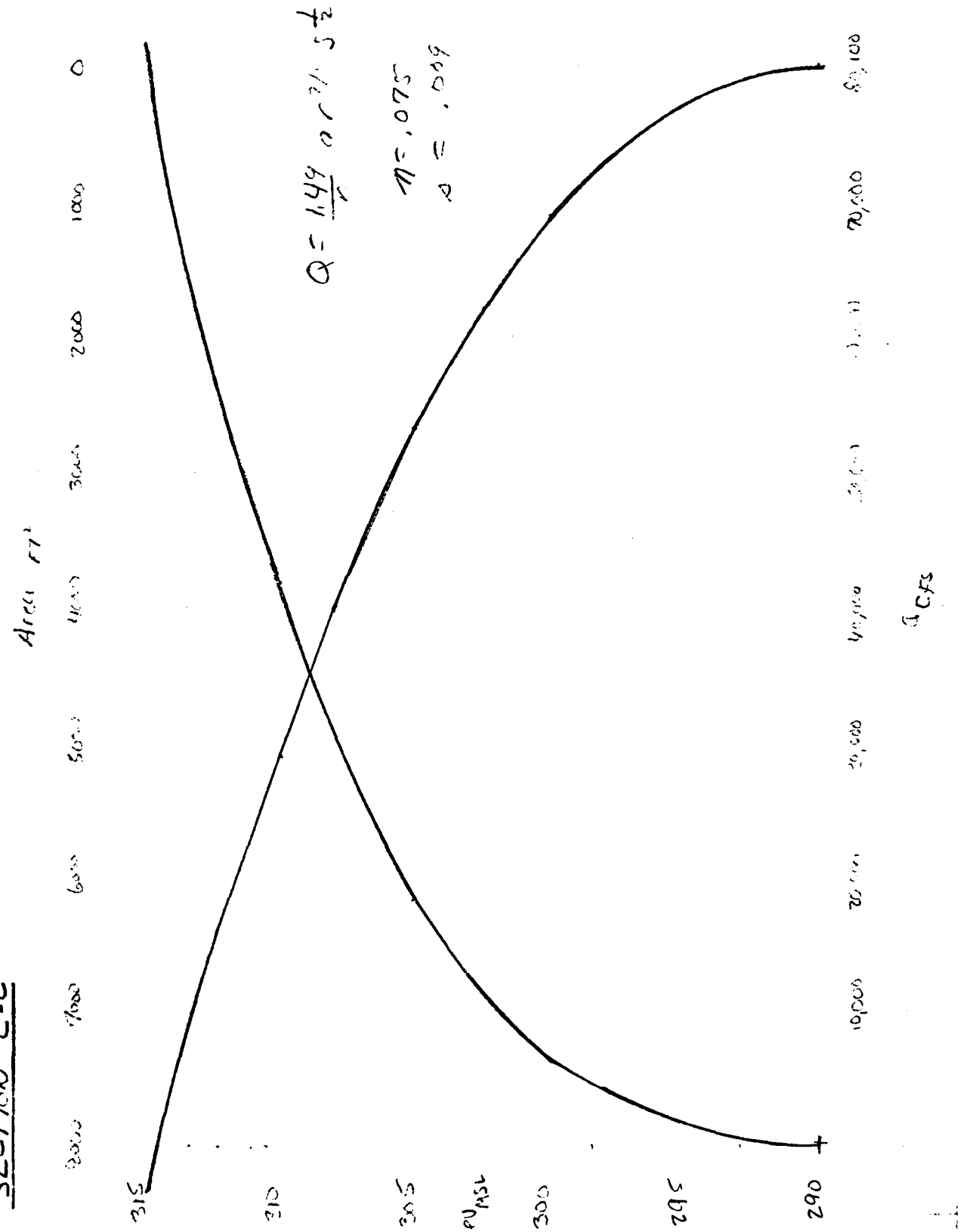
2200 feet downstream of section E-E
6550 feet downstream of Ulbrich Reservoir Dam

PROJ. NO. 824403
DESCRIPTION Ulbrich Reservoir Dam
Wallingford, Conn.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D17 OF 7.
BY WSC DATE 3-3-81
CHKD. BY _____ DATE _____

Ulbrich Reservoir Dam



STAGE - DISCHARGE
STAGE - AREA
SECTION C-C

Ulbrich Reservoir Dam

Dam Breach Analysis (cont.)

$$Q_{P4} = 27,431.1 \left(1 - \frac{(165 + 162)/2}{3140}\right)$$

$Q_{P4} = 25,998$ cfs
elev. = 307.1

Section V-V (d/s of C-C)

$Q_{P4} = 25,998$ cfs
elev. = 277.4
$A_4 = 5,300$ ft²

$Q_{PO} = 75$ cfs
elev. = 270.3
$A_0 = 150$ ft²

$$V_{45} = \frac{(2000)(5300 - 150)}{43,560}$$

$V_{45} = 236$ ac-ft.

$$Q_{P5} = 25,998 \left(1 - \frac{236}{3140}\right)$$

$Q_{P5} = 24,044$ cfs (Att. 1)
elev. = 277.2, $A_5 = 5200$ ft², $V_{45} = 232$ ac ft.

$$Q_{P5} = 25,998 \left(1 - \frac{(236 + 232/2)}{3140}\right)$$

$Q_{P5} = 24,060$ cfs
elev. 277.2

Section E-E (d/s of V-V)

$Q_{P5} = 24,060$ cfs
elev. 249.8
$A_5 = 2,750$ ft²

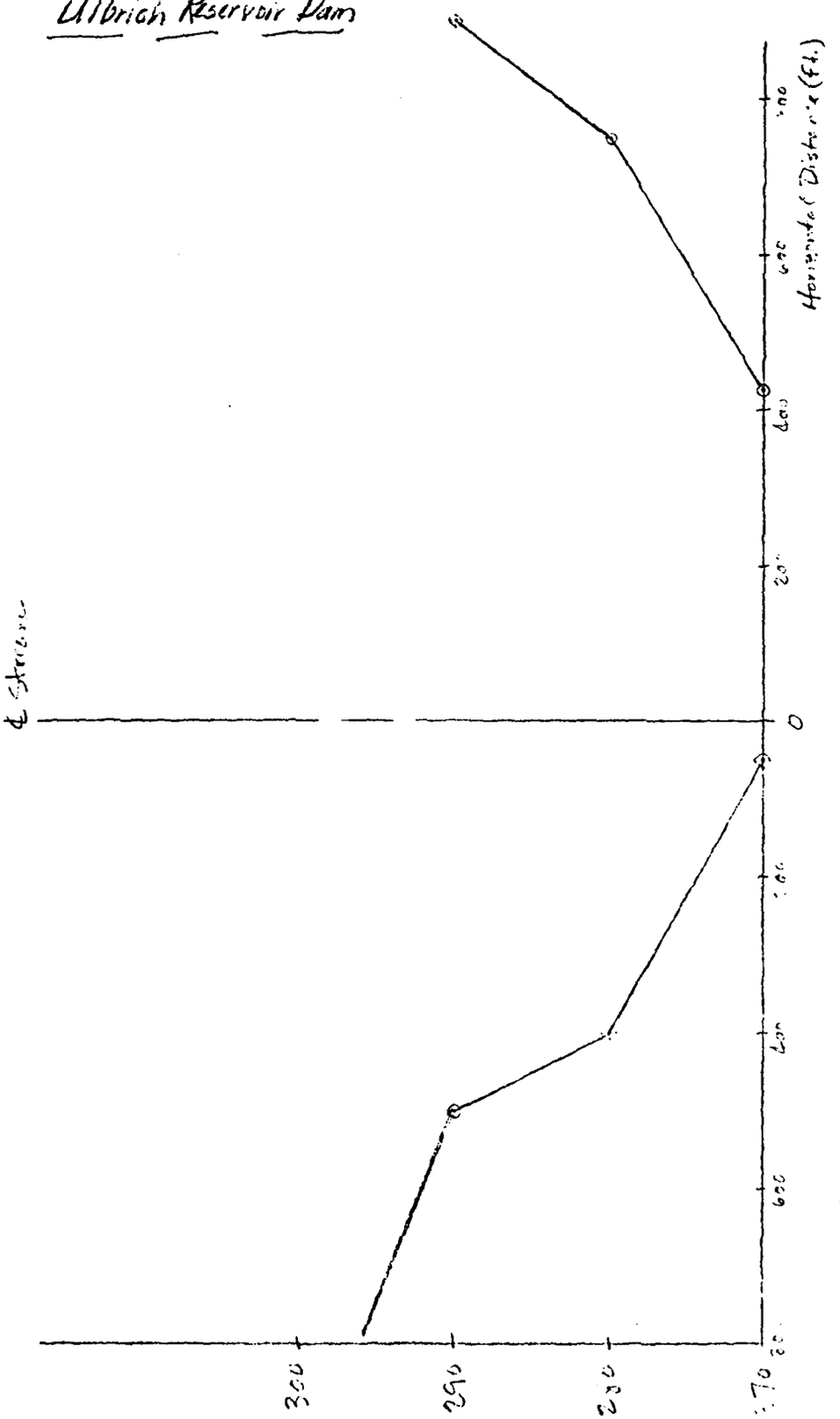
$Q_{PO} = 75$ cfs
elev. = 240.5
$A_0 = 100$ ft²

PROJ. NO. [illegible]
DESCRIPTION Ulbrich Reservoir Dam
Wallingford, Conn.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D15 OF 20
BY DKC DATE 12/1/90
CHKD. BY WJG DATE 3-1-91

Ulbrich Reservoir Dam



LOOKING DOWNSTREAM
SECTION D-D

2000 feet downstream of section C-C
1550 feet downstream of Ulbrich Reservoir Dam

PROJ. NO. B04103
DESCRIPTION Ulbrich Reservoir Dam
Wallingford, Conn

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

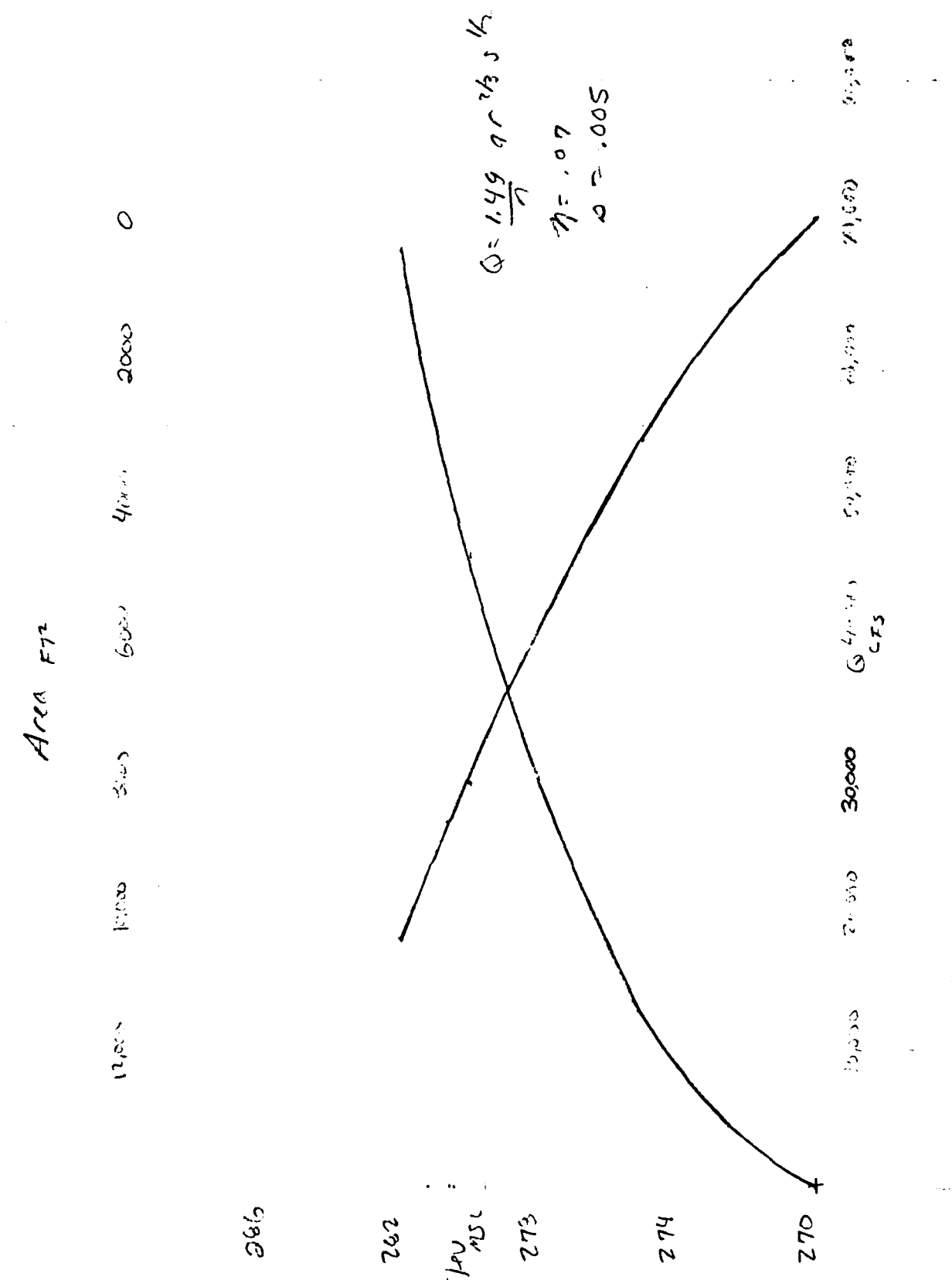
SHEET NO. D16 OF 20
BY _____ DATE _____
CHKD. BY _____ DATE _____

Ulbrich Reservoir Dam

$Q = \frac{1.49}{n} A r^{2/3} S^{1/2}$

$n = .07$

$S = .005$



STAGE - DISCHARGE
STAGE - 1/4 PT. 4
SECTION D-D

Ulbrich Reservoir Dam

Dam Breach Analysis (cont.)

$$V_{SL} = \frac{(2600)(2,750 - 100)}{43,[illegible]00}$$

$V_{SL} = 158$ ac-ft.

$$Q_{P_6} = 24,060\left(1 - \frac{158}{3140}\right)$$

$Q_{P_6} = 22,849$ cfs (trial)

elev$_6$ = 249.6 $A_6 = 2,650$ ft^2, V_{SL} 152 ac-ft.

$$Q_{P_6} = 24,060\left(1 - \frac{(158 + 152)/2}{3140}\right)$$

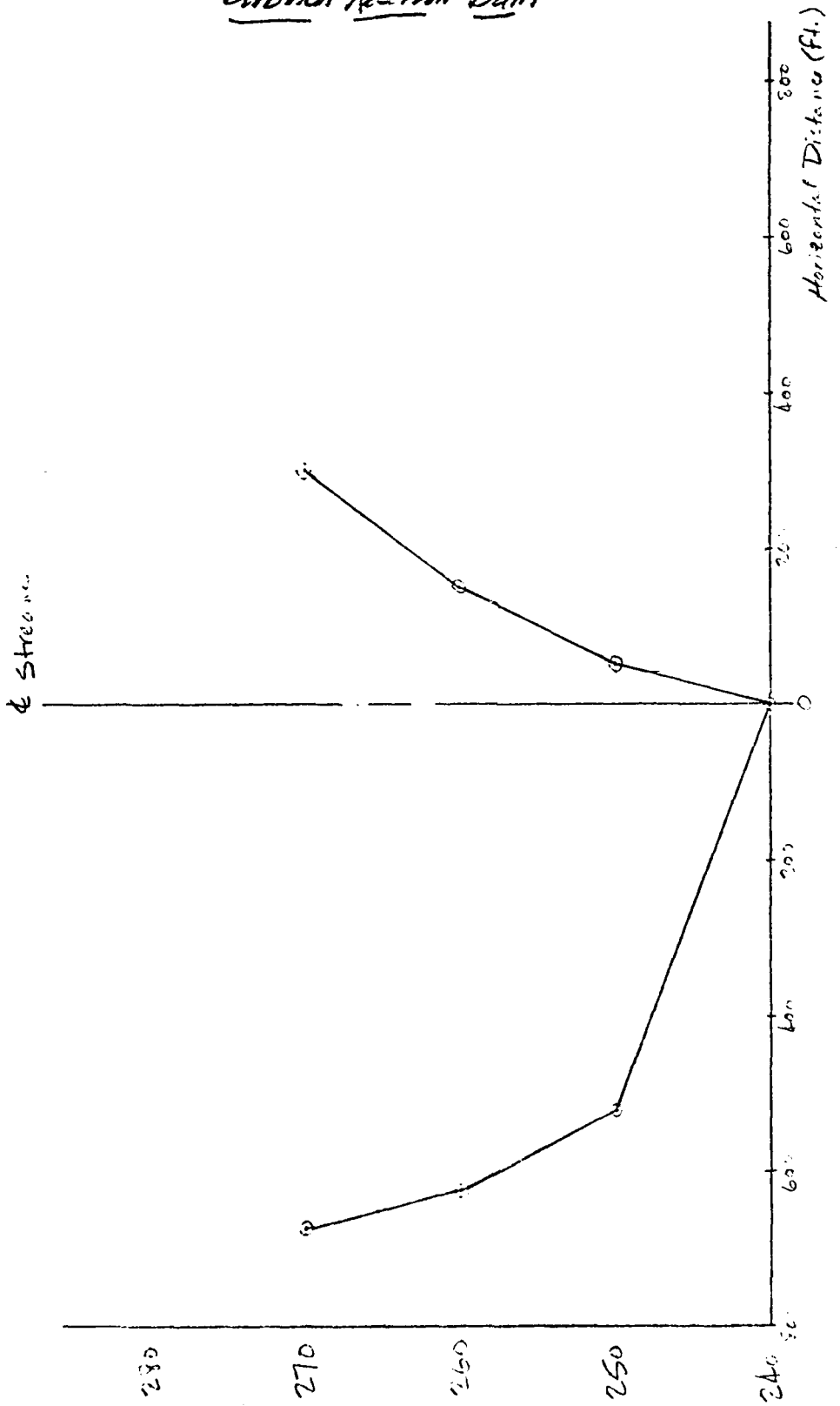
$Q_{P_6} = 22,872$ cfs
elev$_6$ = 249.6

PROJ. NO. 8041.03
DESCRIPTION Ullonia Reservoir Dam, Wallingford, Conn

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D18 OF 20
BY TJC DATE 12/1/80
CHKD. BY WJG DATE 3-3-81

Ullonia Reservoir Dam



LOOKING DOWNSTREAM
SECTION E-E

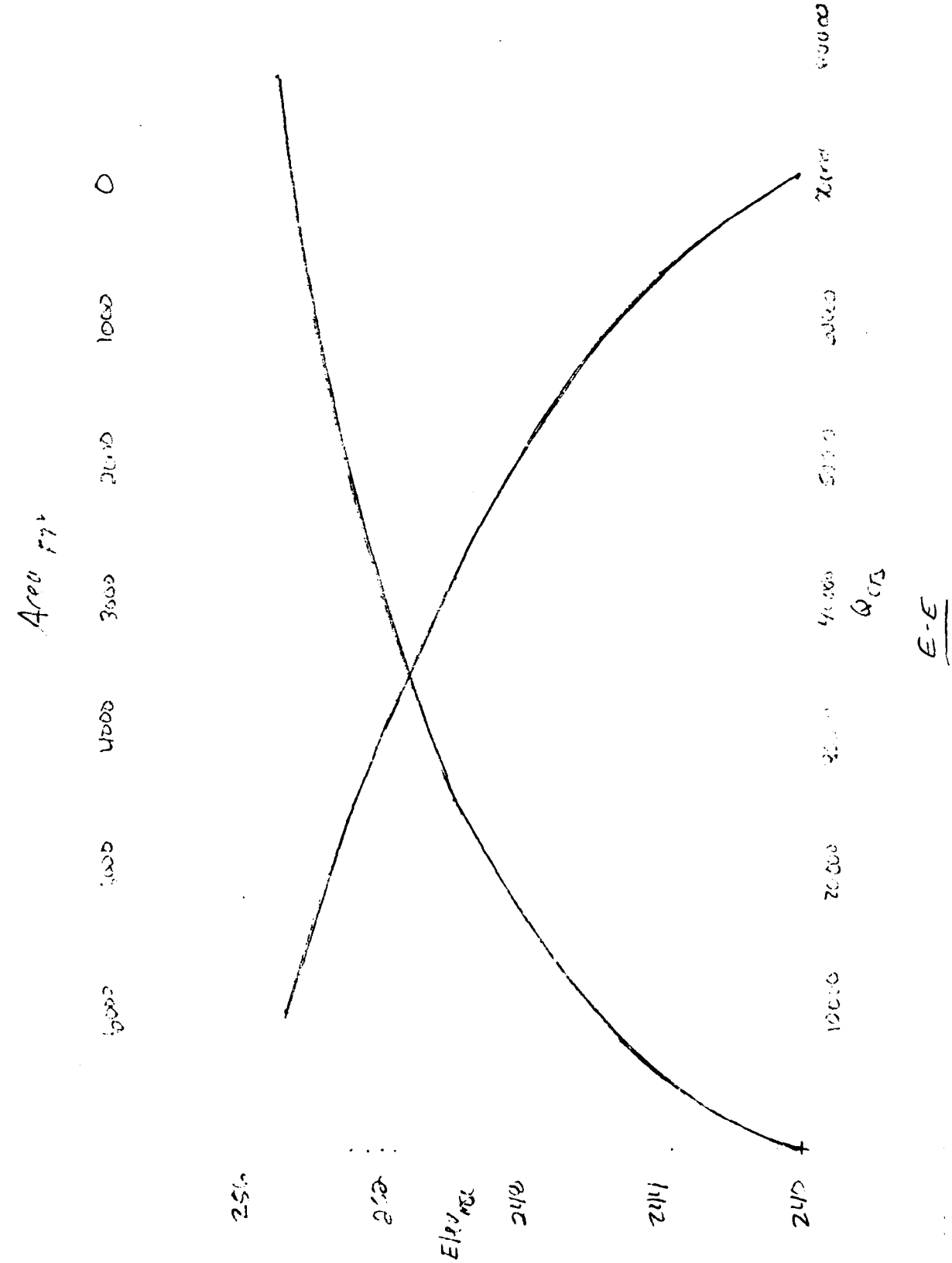
2600 feet downstream of section D-D
11,150 feet downstream of Ullonia Reservoir Dam

PROJ. NO. 804103
DESCRIPTION Ulbrich Reservoir Dam
Wallingford Conn

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D19 OF 20
BY WJG DATE 3-3
CHKD. BY _____ DATE _____

Ulbrich Reservoir Dam



STAGE - DISCHARGE
STAGE - AREA
SECTION E-E

PROJ. NO. 804103
DESCRIPTION Lithia Reservoir Dam
Wallingford, Conn.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. ___ OF ___
BY JC DATE ___
CHKD. BY ___ DATE ___

SUMMARY OF REACH LEVELS

STA	Q_{cfs}	$ELEV_{o\ MSL}$	$ELEV_{after\ PR\ MSL}$	Homes Affected
L.M.	34,425	—		0
2+50	30,122	310.2	318.6 (319.3)	0
45+50	27,431	310.2	319.2	Houses @ 318 PR + Pl. 68 ≈ 320
62+50	25,998	291.0	307.1	RR - 7' water
85+50	24,060	270.3	277.2	Basement Flooding
11[illegible]+50	22,872	240.5	249.6	

The conclusion of the analysis is that 1 home will receive more than 1' of water as a result of the construction of the reservoir & another one will have <1' of flooding. In addition however both the railroad tracks and State Pl. 69 will be exposed to some flooding. A hazard classification of HIGH seems warranted.

APPENDIX E

INFORMATION AS CONTAINED IN

THE NATIONAL INVENTORY OF DAMS

NOT AVAILABLE AT THIS TIME